INSTALLATION MANUAL

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NOTES, CAUTIONS AND WARNINGS

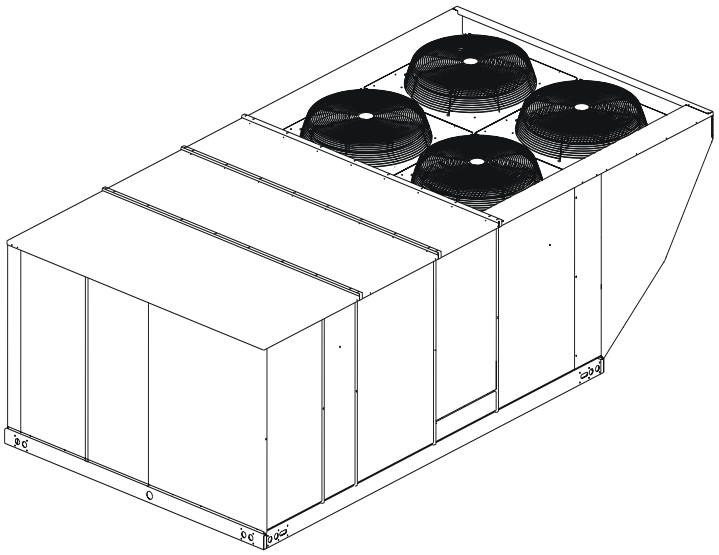
The installer should pay particular attention to the words: *NOTE*, *CAUTION*, and *WARNING*. Notes are intended to clarify or make the installation easier. Cautions are given to prevent equipment damage. Warnings are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

CAUTION: READ ALL SAFETY GUIDES BEFORE YOU BEGIN TO INSTALL YOUR UNIT.

SAVE THIS MANUAL

SUNLINE MagnaDRY™ GAS/ELECTRIC SINGLE PACKAGE AIR CONDITIONERS

MODELS: DR180, 240 & 300



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GENERAL

YORK Model DR units are either single package cooling units equipped with optional factory installed electric heaters, or single package gas-fired central heating furnaces with cooling unit. Both are designed for outdoor installation on a rooftop or slab.

The units are completely assembled on rigid, permanently attached base rails. All piping, refrigerant charge, and electrical wiring is factory installed and tested. The units require electric power, gas connection, duct connections, installation of combustion air inlet hood, flue gas outlet hoods and fixed outdoor air intake damper (units without economizer or motorized damper option only) at the point of installation.

The supplemental electric heaters have nickel-chrome elements and utilize single point power connection.

The gas-fired heaters have aluminized-steel or optional stainless steel, tubular heat exchangers with spark ignition with proven pilot. All gas heaters are shipped from the factory equipped for natural gas use, but can be field converted to L.P./Propane with Kit Model # 1NP0418.

SAFETY CONSIDERATIONS

Due to system pressure, moving parts and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, trained, service personnel should install, repair, maintain or service this equipment.

Observe all precautions in the literature, on labels and tags accompanying the equipment whenever working on air conditioning equipment. Be sure to follow all other safety precautions that apply.

Wear safety glasses and work gloves, and follow all safety codes. Use a quenching cloth and have a fire extinguisher available for all brazing operations.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury, death, or property damage.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

- WHAT TO DO IF YOU SMELL GAS:

  - Do not try to light any appliance.
  - Do not touch any electrical switch; do not use any phone in your building.
  - Leave the building immediately.
  - Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions.
  - If you cannot reach the gas supplier, call the fire department.

- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing. Refer to Form 50.15-NM for additional information.

REFERENCE

Additional information on the design, installation, operation and service of this equipment is available in the following reference forms:

- 035-19856-000 - Barometric Relief Damper Accessory

- 035-19854-000 - Economizer Damper Accessory
- 035-08032-002 - Propane Conversion Accessory (USA)
- 035-13073-001 - High Altitude Accessory (Natural Gas)
- 035-08524-002 - High Altitude Accessory (Propane)

RENEWAL PARTS

Refer to York USER'S MAINTENANCE and SERVICE INFORMATION MANUAL Part Number 035-19699-001.

APPROVALS

Design certified by CSA as follows:

- For use as a cooling unit only with or without optional electric heat.
- For use as a forced air furnace with cooling unit
- For outdoor installation only.
- For installation on combustible material.
- For use with natural gas or propane gas.

⚠ CAUTION

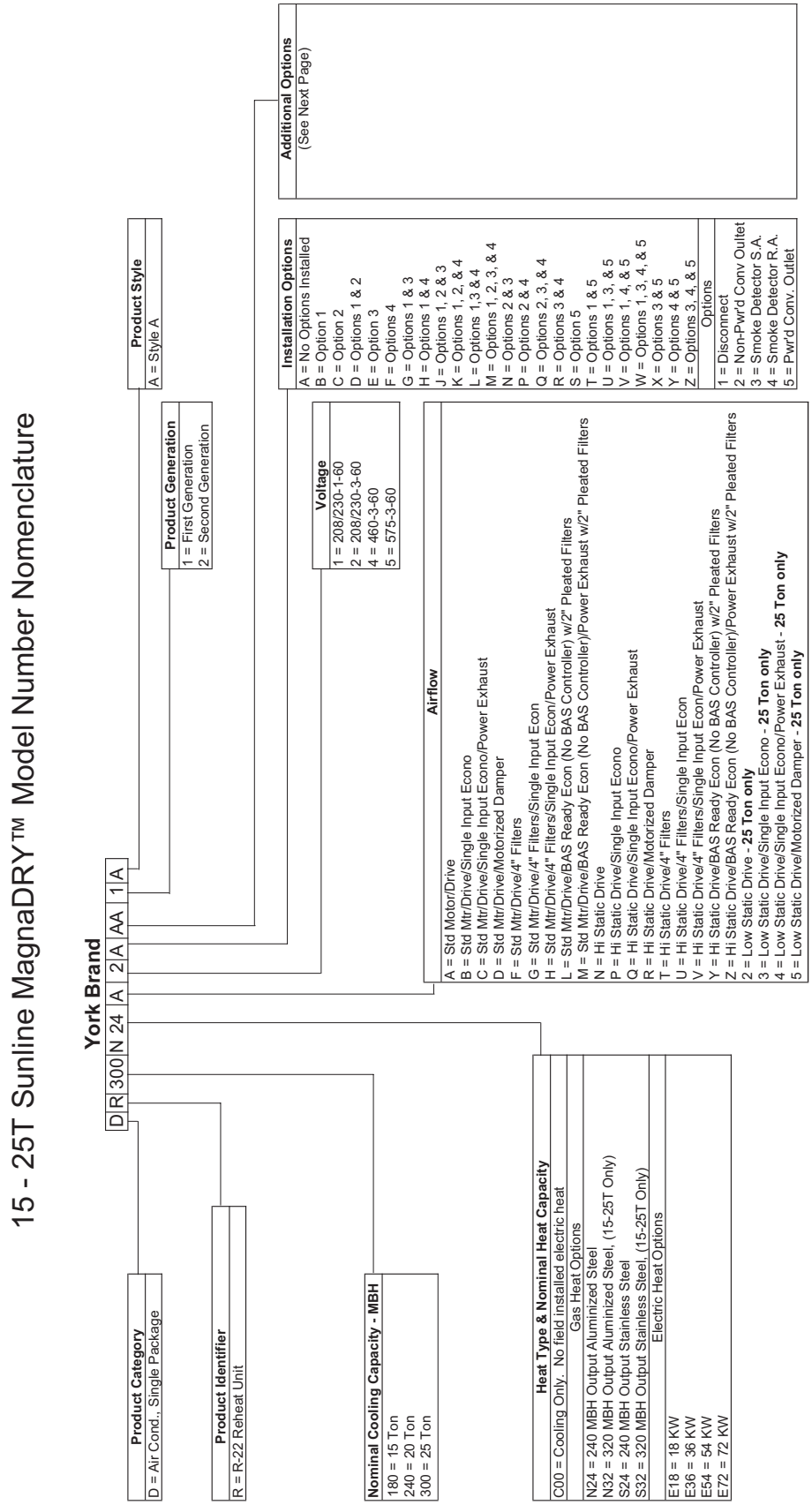
This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

⚠WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.

The installer should pay particular attention to the words: NOTE, CAUTION and WARNING. Notes are intended to clarify or make the installation easier. Cautions are given to prevent equipment damage. Warnings are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

PRODUCT NOMENCLATURE


15 - 25T Sunline MagnaDRY™ Model Number Nomenclature
York Brand
D R 300 N 24 A 2 A AA 1 A
Product Category
D = Air Cond., Single Package
Product Identifier
R = R-22 Reheat Unit
Nominal Cooling Capacity - MBH
180 = 15 Ton
240 = 20 Ton
300 = 25 Ton
Heat Type & Nominal Heat Capacity
C00 = Cooling Only. No field installed electric heat
Gas Heat Options
N24 = 240 MBH Output Aluminized Steel
N32 = 320 MBH Output Aluminized Steel, (15-25T Only)
S24 = 240 MBH Output Stainless Steel
S32 = 320 MBH Output Stainless Steel, (15-25T Only)
Electric Heat Options
E18 = 18 KW
E36 = 36 KW
E54 = 54 KW
E72 = 72 KW
Product Generation
1 = First Generation
2 = Second Generation
Voltage
1 = 208/230-1-60
2 = 208/230-3-60
4 = 460-3-60
5 = 575-3-60
Airflow
A = Std Motor/Drive
B = Std Mtr/Drive/Single Input Econo
C = Std Mtr/Drive/Single Input Econo/Power Exhaust
D = Std Mtr/Drive/Motorized Damper
F = Std Mtr/Drive/4" Filters
G = Std Mtr/Drive/4" Filters/Single Input Econ
H = Std Mtr/Drive/4" Filters/Single Input Econ/Power Exhaust
L = Std Mtr/Drive/BAS Ready Econ (No BAS Controller) w/2" Pleated Filters
M = Std Mtr/Drive/BAS Ready Econ (No BAS Controller)/Power Exhaust w/2" Pleated Filters
N = Hi Static Drive
P = Hi Static Drive/Single Input Econo
Q = Hi Static Drive/Single Input Econo/Power Exhaust
R = Hi Static Drive/Motorized Damper
T = Hi Static Drive/4" Filters
U = Hi Static Drive/4" Filters/Single Input Econ
V = Hi Static Drive/4" Filters/Single Input Econ/Power Exhaust
Y = Hi Static Drive/BAS Ready Econ (No BAS Controller) w/2" Pleated Filters
Z = Hi Static Drive/BAS Ready Econ (No BAS Controller)/Power Exhaust w/2" Pleated Filters
2 = Low Static Drive - 25 Ton only
3 = Low Static Drive/Single Input Econo - 25 Ton only
4 = Low Static Drive/Single Input Econo/Power Exhaust - 25 Ton only
5 = Low Static Drive/Motorized Damper - 25 Ton only
Product Style
A = Style A
Installation Options
A = No Options Installed
B = Option 1
C = Option 2
D = Options 1 & 2
E = Option 3
F = Options 4
G = Options 1 & 3
H = Options 1 & 4
J = Options 1, 2 & 3
K = Options 1, 2, & 4
L = Options 1,3 & 4
M = Options 1, 2, 3, & 4
N = Options 2 & 3
P = Options 2 & 4
Q = Options 2, 3, & 4
R = Options 3 & 4
S = Option 5
T = Options 1 & 5
U = Options 1, 3, & 5
V = Options 1, 4, & 5
W = Options 1, 3, 4, & 5
X = Options 3 & 5
Y = Options 4 & 5
Z = Options 3, 4, & 5
Options
1 = Disconnect
2 = Non-Pwr'd Conv Outlet
3 = Smoke Detector S.A.
4 = Smoke Detector R.A.
5 = Pwr'd Conv. Outlet
Additional Options
(See Next Page)

PRODUCT NOMENCLATURE - CONTINUED

15-25T Sunline Magna DRY™ Model Number Nomenclature

Additional Options - Standard Cabinet	
AA	None
AB	Phase Monitor
AC	Coil Guard
AD	Dirty Filter Switch
AE	Phase Monitor & Coil Guard
AF	Phase Monitor & Dirty Filter Switch
AG	Coil Guard & Dirty Filter Switch
AH	Phase Monitor, Coil Guard, & Dirty Filter Switch
AJ	SS Drain Pan
AK	SS Drain Pan & Phase Monitor
AL	SS Drain Pan & Coil Guard
AM	SS Drain Pan & Dirty Filter Switch
AN	SS Drain Pan, Phase Monitor, Coil Guard & Dirty Filter Switch
AP	Double Wall
AQ	Double Wall & Phase Monitor
AR	Double Wall & Dirty Filter Switch
AT	Double Wall & Coil Guard
AU	Double Wall & Phase Monitor, Dirty Filter Switch & Coil Guard
AV	Double Wall, SS Drain Pan
AW	Double Wall & SS Drain Pan & Phase Monitor
AX	Double Wall & SS Drain Pan & Coil Guard
AY	Double Wall & SS Drain Pan & Dirty Filter Switch
AZ	Double Wall & SS Drain Pan & Phase Monitor, Coil Guard, Dirty Filter Switch
CA	CPC Controller with Dirty Filter Switch & Air Proving Switch
CB	CPC Controller, DFS, APS & Phase Monitor
CC	CPC Controller, DFS, APS & Coil Guard
CD	CPC Controller, DFS, APS, Phase Monitor, & Coil Guard
CE	CPC Controller, DFS, APS & Technicoat Cond. Coil
CF	CPC Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
CG	CPC Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
CH	CPC Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
CJ	CPC Controller, DFS, APS & Technicoat Evap. Coil
CK	CPC Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
CL	CPC Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
CM	CPC Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
CN	CPC Controller, DFS, APS & Technicoat Evap. & Cond Coils
CP	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
CQ	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
CR	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
CS	CPC Controller, DFS, APS, SS Drain Pan
CT	CPC Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard
CU	CPC Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
CV	CPC Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil
CW	CPC Controller, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
CX	CPC Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
CY	CPC Controller, DFS, APS, Double Wall
CZ	CPC Controller, DFS, APS, Double Wall, Phase Monitor, & Coil Guard
C1	CPC Controller, DFS, APS, Double Wall, & Technicoat Cond Coils
C2	CPC Controller, DFS, APS, Double Wall, & Technicoat Evap Coil
C3	CPC Controller, DFS, APS, Double Wall, & Technicoat Evap and Cond Coils
C4	CPC Controller, DFS, APS, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils

Additional Options - Standard Cabinet	
C5	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard
C6	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Cond Coils
C7	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap Coil
C8	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils
C9	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
JA	Johnson UNT Controller with Dirty Filter Switch & Air Proving Switch
JB	Johnson UNT Controller, DFS, APS & Phase Monitor
JC	Johnson UNT Controller, DFS, APS & Coil Guard
JD	Johnson UNT Controller, DFS, APS, Phase Monitor, & Coil Guard
JE	Johnson UNT Controller, DFS, APS & Technicoat Cond. Coil
JF	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
JG	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
JH	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
JJ	Johnson UNT Controller, DFS, APS & Technicoat Evap. Coil
JK	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
JL	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
JM	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
JN	Johnson UNT Controller, DFS, APS & Technicoat Evap. & Cond Coils
JP	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
JQ	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
JR	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
JS	Johnson UNT Controller, DFS, APS, SS Drain Pan
JT	Johnson UNT Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard
JU	Johnson UNT Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
JV	Johnson UNT Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil
JW	Johnson UNT Controller, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
JX	Johnson UNT Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
JY	Johnson UNT Controller, DFS, APS, Double Wall
JZ	Johnson UNT Controller, DFS, APS, Double Wall, Phase Monitor, & Coil Guard
J1	Johnson UNT Controller, DFS, APS, Double Wall, & Technicoat Cond Coils
J2	Johnson UNT Controller, DFS, APS, Double Wall, & Technicoat Evap Coil
J3	Johnson UNT Controller, DFS, APS, Double Wall, & Technicoat Evap and Cond Coils
J4	Johnson UNT Controller, DFS, APS, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
J5	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard
J6	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Cond Coils
J7	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap Coil
J8	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils
J9	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
HA	Honeywell Excel 10 Controller with Dirty Filter Switch & Air Proving Switch
HB	Honeywell Excel 10 Controller, DFS, APS & Phase Monitor
HC	Honeywell Excel 10 Controller, DFS, APS & Coil Guard
HD	Honeywell Excel 10 Controller, DFS, APS, Phase Monitor, & Coil Guard
HE	Honeywell Excel 10 Controller, DFS, APS & Technicoat Cond. Coil
HF	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
HG	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
HH	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
HJ	Honeywell Excel 10 Controller, DFS, APS & Technicoat Evap. Coil
HK	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
HL	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
HM	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
HN	Honeywell Excel 10 Controller, DFS, APS & Technicoat Evap. & Cond Coils
HP	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
HQ	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
HR	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
HS	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan
HT	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard

Additional Options - Standard Cabinet	
HU	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
HV	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil
HW	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
HX	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
HY	Honeywell Excel 10 Controller, DFS, APS, Double Wall
HZ	Honeywell Excel 10 Controller, DFS, APS, Double Wall, Phase Monitor, & Coil Guard
H1	Honeywell Excel 10 Controller, DFS, APS, Double Wall, & Technicoat Cond Coils
H2	Honeywell Excel 10 Controller, DFS, APS, Double Wall, & Technicoat Evap Coil
H3	Honeywell Excel 10 Controller, DFS, APS, Double Wall, & Technicoat Evap and Cond Coils
H4	Honeywell Excel 10 Controller, DFS, APS, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
H5	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard
H6	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Cond Coils
H7	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap Coil
H8	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils
H9	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
NA	Novar ETC-3 Controller with Dirty Filter Switch & Air Proving Switch
NB	Novar ETC-3 Controller, DFS, APS & Phase Monitor
NC	Novar ETC-3 Controller, DFS, APS & Coil Guard
ND	Novar ETC-3 Controller, DFS, APS, Phase Monitor, & Coil Guard
NE	Novar ETC-3 Controller, DFS, APS & Technicoat Cond. Coil
NF	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
NG	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
NH	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
NJ	Novar ETC-3 Controller, DFS, APS & Technicoat Evap. Coil
NK	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
NL	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
NM	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
NN	Novar ETC-3 Controller, DFS, APS & Technicoat Evap. & Cond Coils
NP	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
NQ	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
NR	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
NS	Novar ETC-3 Controller, DFS, APS, SS Drain Pan
NT	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard
NU	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
NV	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil
NW	Novar ETC-3, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
NX	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
NY	Novar ETC-3 Controller, DFS, APS, Double Wall
NZ	Novar ETC-3 Controller, DFS, APS, Double Wall, Phase Monitor, & Coil Guard
N1	Novar ETC-3 Controller, DFS, APS, Double Wall, & Technicoat Cond Coils
N2	Novar ETC-3 Controller, DFS, APS, Double Wall, & Technicoat Evap Coil
N3	Novar ETC-3 Controller, DFS, APS, Double Wall, & Technicoat Evap and Cond Coils
N4	Novar ETC-3 Controller, DFS, APS, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
N5	Novar ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard
N6	Novar ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Cond Coils
N7	Novar ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap Coil
N8	Novar ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils
N9	Noval ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
TA	Technicoat Condenser Coil
TB	Technicoat Condenser Coil & Phase Monitor
TC	Technicoat Condenser Coil & Coil Guard
TD	Technicoat Condenser Coil & Dirty Filter Switch
TE	Technicoat Condenser Coil, Phase Monitor, & Coil Guard
TF	Technicoat Condenser Coil, Phase Monitor, & Dirty Filter Switch
TG	Technicoat Condenser Coil, Coil Guard, & Dirty Filter Switch
TH	Technicoat Condenser Coil, Phase Monitor, Coil Guard, & Dirty Filter Switch

Additional Options - Standard Cabinet	
TJ	Technicoat Evaporator Coil
TK	Technicoat Evaporator Coil & Phase Monitor
TL	Technicoat Evaporator Coil & Coil Guard
TM	Technicoat Evaporator Coil & Dirty Filter Switch
TN	Technicoat Evaporator Coil, Phase Monitor, & Coil Guard
TP	Technicoat Evaporator Coil, Phase Monitor, & Dirty Filter Switch
TQ	Technicoat Evaporator Coil, Coil Guard, & Dirty Filter Switch
TR	Technicoat Evaporator Coil, Phase Monitor, Coil Guard, & Dirty Filter Switch
TS	Technicoat Evaporator & Condenser Coils
TT	Technicoat Evaporator & Condenser Coils & Phase Monitor
TU	Technicoat Evaporator & Condenser Coils & Coil Guard
TV	Technicoat Evaporator & Condenser Coils & Dirty Filter Switch
TW	Technicoat Evaporator & Condenser Coils, Phase Monitor, & Coil Guard
TX	Technicoat Evaporator & Condenser Coils, Phase Monitor, & Dirty Filter Switch
TY	Technicoat Evaporator & Condenser Coils, Coil Guard, & Dirty Filter Switch
TZ	Technicoat Evaporator & Condenser Coils, Phase Monitor, Coil Guard, & Dirty Filter Switch
T1	Technicoat Condenser & SS Drain Pan
T2	Technicoat Condenser & Double Wall
T3	Technicoat Condenser Coil, SS Drain Pan, Double Wall, Phase Monitor, Coil Guard, & Dirty Filter Switch
T4	Technicoat Evaporator & SS Drain Pan
T5	Technicoat Evaporator & Double Wall
T6	Technicoat Evaporator Coil, SS Drain Pan, Double Wall, Phase Monitor, Coil Guard, & Dirty Filter Switch
T7	Technicoat Evaporator & Condenser Coils & SS Drain Pan
T8	Technicoat Evaporator & Condenser Coils & Double Wall
T9	Technicoat Evaporator & Condenser Coils, SS Drain Pan, Double Wall, Phase Monitor, Coil Guard, & Dirty Filter Switch
LA	Simplicity Intelli-Comfort Controller
LB	Simplicity Intelli-Comfort Controller, & Phase Monitor
LC	Simplicity Intelli-Comfort Controller, & Coil Guard
LD	Simplicity Intelli-Comfort Controller, Phase Monitor, & Coil Guard
LE	Simplicity Intelli-Comfort Controller, & Technicoat Cond. Coil
LF	Simplicity Intelli-Comfort Controller, Technicoat Cond. Coil, & Phase Monitor
LG	Simplicity Intelli-Comfort Controller, Technicoat Cond. Coil, & Coil Guard
LH	Simplicity Intelli-Comfort Controller, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
LJ	Simplicity Intelli-Comfort Controller, & Technicoat Evap. Coil
LK	Simplicity Intelli-Comfort Controller, Technicoat Evap. Coil, & Phase Monitor
LL	Simplicity Intelli-Comfort Controller, Technicoat Evap. Coil, & Coil Guard
LM	Simplicity Intelli-Comfort Controller, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
LN	Simplicity Intelli-Comfort Controller, & Technicoat Evap. & Cond Coils
LP	Simplicity Intelli-Comfort Controller, Technicoat Evap. & Cond Coils, & Phase Monitor
LQ	Simplicity Intelli-Comfort Controller, Technicoat Evap. & Cond Coils, & Coil Guard
LR	Simplicity Intelli-Comfort Controller, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
LS	Simplicity Intelli-Comfort Controller, SS Drain Pan
LT	Simplicity Intelli-Comfort Controller, SS Drain Pan, Phase Monitor, & Coil Guard
LU	Simplicity Intelli-Comfort Controller, SS Drain Pan, & Technicoat Cond Coils
LV	Simplicity Intelli-Comfort Controller, SS Drain Pan, & Technicoat Evap Coil
LW	Simplicity Intelli-Comfort Controller, SS Drain Pan, & Technicoat Evap and Cond Coils
LX	Simplicity Intelli-Comfort Controller, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
LY	Simplicity Intelli-Comfort Controller, Double Wall
LZ	Simplicity Intelli-Comfort Controller, Double Wall, Phase Monitor, & Coil Guard
L1	Simplicity Intelli-Comfort Controller, Double Wall, & Technicoat Cond Coils
L2	Simplicity Intelli-Comfort Controller, Double Wall, & Technicoat Evap Coil
L3	Simplicity Intelli-Comfort Controller, Double Wall, & Technicoat Evap and Cond Coils
L4	Simplicity Intelli-Comfort Controller, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
L5	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard
L6	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, & Technicoat Cond Coils

Additional Options - Standard Cabinet	
L7	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, & Technicoat Evap Coil
L8	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils
L9	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
WA	Intelli-Comfort w/ModLINC Controller
WB	Intelli-Comfort w/ModLINC Controller, & Phase Monitor
WC	Intelli-Comfort w/ModLINC Controller, & Coil Guard
WD	Intelli-Comfort w/ModLINC Controller, Phase Monitor, & Coil Guard
WE	Intelli-Comfort w/ModLINC Controller, & Technicoat Cond. Coil
WF	Intelli-Comfort w/ModLINC Controller, Technicoat Cond. Coil, & Phase Monitor
WG	Intelli-Comfort w/ModLINC Controller, Technicoat Cond. Coil, & Coil Guard
WH	Intelli-Comfort w/ModLINC Controller, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
WJ	Intelli-Comfort w/ModLINC Controller, & Technicoat Evap. Coil
WK	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. Coil, & Phase Monitor
WL	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. Coil, & Coil Guard
WM	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
WN	Intelli-Comfort w/ModLINC Controller, & Technicoat Evap. & Cond Coils
WP	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. & Cond Coils, & Phase Monitor
WQ	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. & Cond Coils, & Coil Guard
WR	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
WS	Intelli-Comfort w/ModLINC Controller, SS Drain Pan
WT	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, Phase Monitor, & Coil Guard
WU	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, & Technicoat Cond Coils
WV	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, & Technicoat Evap Coil
WW	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, & Technicoat Evap and Cond Coils
WX	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
WY	Intelli-Comfort w/ModLINC Controller, Double Wall
WZ	Intelli-Comfort w/ModLINC Controller, Double Wall, Phase Monitor, & Coil Guard
W1	Intelli-Comfort w/ModLINC Controller, Double Wall, & Technicoat Cond Coils
W2	Intelli-Comfort w/ModLINC Controller, Double Wall, & Technicoat Evap Coil
W3	Intelli-Comfort w/ModLINC Controller, Double Wall, & Technicoat Evap and Cond Coils
W4	Intelli-Comfort w/ModLINC Controller, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
W5	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard
W6	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, & Technicoat Cond Coils
W7	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, & Technicoat Evap Coil
W8	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils
W9	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils

Additional Options - Hinged Filter Door & Toolless Access Cabinet	
BA	Hinged Filter Door & Toolless Access Panels
BB	Phase Monitor, Hinged Filter Door & Toolless Access Panels
BC	Coil Guard, Hinged Filter Door & Toolless Access Panels
BD	Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
BE	Phase Monitor & Coil Guard, Hinged Filter Door & Toolless Access Panels
BF	Phase Monitor & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
BG	Coil Guard & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
BH	Phase Monitor, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
BJ	SS Drain Pan & Hinged Filter Door & Toolless Access Panels
BK	SS Drain Pan & Phase Monitor, Hinged Filter Door & Toolless Access Panels
BL	SS Drain Pan & Coil Guard, Hinged Filter Door & Toolless Access Panels
BM	SS Drain Pan & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
BN	SS Drain Pan & Phase Monitor & Coil Guard, Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
BP	Double Wall
BQ	Double Wall & Phase Monitor
BR	Double Wall & Dirty Filter Switch

Additional Options - Hinged Filter Door & Toolless Access Cabinet	
BT	Double Wall & Coil Guard
BU	Double Wall & Phase Monitor, Dirty Filter Switch & Coil Guard
BV	Double Wall & SS Drain Pan
BW	Double Wall & SS Drain Pan & Phase Monitor
BX	Double Wall & SS Drain Pan & Coil Guard
BY	Double Wall & SS Drain Pan & Dirty Filter Switch
BZ	Double Wall & SS Drain Pan & Phase Monitor, Coil Guard, Dirty Filter Switch
DA	CPC Controller with Dirty Filter Switch & Air Proving Switch, Hinged Filter Door & Toolless Access Panels
DB	CPC Controller, DFS, APS & Phase Monitor, Hinged Filter Door & Toolless Access Panels
DC	CPC Controller, DFS, APS & Coil Guard, Hinged Filter Door & Toolless Access Panels
DD	CPC Controller, DFS, APS, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
DE	CPC Controller, DFS, APS & Technicoat Cond. Coil, Hinged Filter Door & Toolless Access Panels
DF	CPC Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
DG	CPC Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
DH	CPC Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
DJ	CPC Controller, DFS, APS & Technicoat Evap. Coil, Hinged Filter Door & Toolless Access Panels
DK	CPC Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
DL	CPC Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
DM	CPC Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
DN	CPC Controller, DFS, APS & Technicoat Evap. & Cond Coils, Hinged Filter Door & Toolless Access Panels
DP	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
DQ	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard, Hinged Filter Door & Toolless Access Panels
DR	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
DS	CPC Controller, DFS, APS, SS Drain Pan Hinged Filter Door & Toolless Access Panels
DT	CPC Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
DU	CPC Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
DV	CPC Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
DW	CPC Controller, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
DX	CPC Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
DY	CPC Controller, DFS, APS, Double Wall Hinged Filter Door & Toolless Access Panels
DZ	CPC Controller, DFS, APS, Double Wall, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
D1	CPC Controller, DFS, APS, Double Wall, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
D2	CPC Controller, DFS, APS, Double Wall, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
D3	CPC Controller, DFS, APS, Double Wall, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
D4	CPC Controller, DFS, APS, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
D5	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
D6	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
D7	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
D8	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
D9	CPC Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
EA	Johnson UNT Controller with Dirty Filter Switch & Air Proving Switch, Hinged Filter Door & Toolless Access Panels
EB	Johnson UNT Controller, DFS, APS & Phase Monitor, Hinged Filter Door & Toolless Access Panels
EC	Johnson UNT Controller, DFS, APS & Coil Guard, Hinged Filter Door & Toolless Access Panels
ED	Johnson UNT Controller, DFS, APS, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
EE	Johnson UNT Controller, DFS, APS & Technicoat Cond. Coil, Hinged Filter Door & Toolless Access Panels
EF	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
EG	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
EH	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
EJ	Johnson UNT Controller, DFS, APS & Technicoat Evap. Coil, Hinged Filter Door & Toolless Access Panels
EK	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
EL	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
EM	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels

Additional Options - Hinged Filter Door & Toolless Access Cabinet	
EN	Johnson UNT Controller, DFS, APS & Technicoat Evap. & Cond Coils, Hinged Filter Door & Toolless Access Panels
EP	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
EQ	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard, Hinged Filter Door & Toolless Access Panels
ER	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
ES	Johnson UNT Controller, DFS, APS, SS Drain Pan Hinged Filter Door & Toolless Access Panels
ET	Johnson UNT Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
EU	Johnson UNT Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
EV	Johnson UNT Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
EW	Johnson UNT Controller, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
EX	Johnson UNT Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
EY	Johnson UNT Controller, DFS, APS, Double Wall Hinged Filter Door & Toolless Access Panels
EZ	Johnson UNT Controller, DFS, APS, Double Wall, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
E1	Johnson UNT Controller, DFS, APS, Double Wall, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
E2	Johnson UNT Controller, DFS, APS, Double Wall, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
E3	Johnson UNT Controller, DFS, APS, Double Wall, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
E4	Johnson UNT Controller, DFS, APS, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
E5	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
E6	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
E7	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
E8	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
E9	Johnson UNT Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
GA	Honeywell Excel 10 Controller with Dirty Filter Switch & Air Proving Switch, Hinged Filter Door & Toolless Access Panels
GB	Honeywell Excel 10 Controller, DFS, APS & Phase Monitor, Hinged Filter Door & Toolless Access Panels
GC	Honeywell Excel 10 Controller, DFS, APS & Coil Guard, Hinged Filter Door & Toolless Access Panels
GD	Honeywell Excel 10 Controller, DFS, APS, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
GE	Honeywell Excel 10 Controller, DFS, APS & Technicoat Cond. Coil, Hinged Filter Door & Toolless Access Panels
GF	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
GG	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
GH	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
GJ	Honeywell Excel 10 Controller, DFS, APS & Technicoat Evap. Coil, Hinged Filter Door & Toolless Access Panels
GK	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
GL	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
GM	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
GN	Honeywell Excel 10 Controller, DFS, APS & Technicoat Evap. & Cond Coils, Hinged Filter Door & Toolless Access Panels
GP	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
GQ	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard, Hinged Filter Door & Toolless Access Panels
GR	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
GS	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan
GT	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard
GU	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
GV	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil
GW	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
GX	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
GY	Honeywell Excel 10 Controller, DFS, APS, Double Wall
GZ	Honeywell Excel 10 Controller, DFS, APS, Double Wall, Phase Monitor, & Coil Guard
G1	Honeywell Excel 10 Controller, DFS, APS, Double Wall, & Technicoat Cond Coils
G2	Honeywell Excel 10 Controller, DFS, APS, Double Wall, & Technicoat Evap Coil
G3	Honeywell Excel 10 Controller, DFS, APS, Double Wall, & Technicoat Evap and Cond Coils
G4	Honeywell Excel 10 Controller, DFS, APS, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
G5	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard

Additional Options - Hinged Filter Door & Toolless Access Cabinet	
G6	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Cond Coils
G7	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap Coil
G8	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils
G9	Honeywell Excel 10 Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
PA	Novar ETC-3 Controller with Dirty Filter Switch & Air Proving Switch, Hinged Filter Door & Toolless Access Panels
PB	Novar ETC-3 Controller, DFS, APS & Phase Monitor, Hinged Filter Door & Toolless Access Panels
PC	Novar ETC-3 Controller, DFS, APS & Coil Guard, Hinged Filter Door & Toolless Access Panels
PD	Novar ETC-3 Controller, DFS, APS, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
PE	Novar ETC-3 Controller, DFS, APS & Technicoat Cond. Coil, Hinged Filter Door & Toolless Access Panels
PF	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
PG	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
PH	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
PJ	Novar ETC-3 Controller, DFS, APS & Technicoat Evap. Coil, Hinged Filter Door & Toolless Access Panels
PK	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
PL	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
PM	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
PN	Novar ETC-3 Controller, DFS, APS & Technicoat Evap. & Cond Coils, Hinged Filter Door & Toolless Access Panels
PP	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
PQ	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard, Hinged Filter Door & Toolless Access Panels
PR	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
PS	Novar ETC-3 Controller, DFS, APS, SS Drain Pan
PT	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard
PU	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
PV	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil
PW	Novar ETC-3, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
PX	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
PY	Novar ETC-3 Controller, DFS, APS, Double Wall
PZ	Novar ETC-3 Controller, DFS, APS, Double Wall, Phase Monitor, & Coil Guard
P1	Novar ETC-3 Controller, DFS, APS, Double Wall, & Technicoat Cond Coils
P2	Novar ETC-3 Controller, DFS, APS, Double Wall, & Technicoat Evap Coil
P3	Novar ETC-3 Controller, DFS, APS, Double Wall, & Technicoat Evap and Cond Coils
P4	Novar ETC-3 Controller, DFS, APS, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
P5	Novar ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard
P6	Novar ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Cond Coils
P7	Novar ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap Coil
P8	Novar ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils
P9	Novar ETC-3 Controller, DFS, APS, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
UA	Technicoat Condenser Coil, Hinged Filter Door & Toolless Access Panels
UB	Technicoat Condenser Coil & Phase Monitor, Hinged Filter Door & Toolless Access Panels
UC	Technicoat Condenser Coil & Coil Guard, Hinged Filter Door & Toolless Access Panels
UD	Technicoat Condenser Coil & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UE	Technicoat Condenser Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
UF	Technicoat Condenser Coil, Phase Monitor, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UG	Technicoat Condenser Coil, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UH	Technicoat Condenser Coil, Phase Monitor, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UJ	Technicoat Evaporator Coil, Hinged Filter Door & Toolless Access Panels
UK	Technicoat Evaporator Coil & Phase Monitor, Hinged Filter Door & Toolless Access Panels
UL	Technicoat Evaporator Coil & Coil Guard, Hinged Filter Door & Toolless Access Panels
UM	Technicoat Evaporator Coil & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UN	Technicoat Evaporator Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
UP	Technicoat Evaporator Coil, Phase Monitor, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UQ	Technicoat Evaporator Coil, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UR	Technicoat Evaporator Coil, Phase Monitor, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
US	Technicoat Evaporator & Condenser Coils, Hinged Filter Door & Toolless Access Panels

Additional Options - Hinged Filter Door & Toolless Access Cabinet	
UT	Technicoat Evaporator & Condenser Coils & Phase Monitor, Hinged Filter Door & Toolless Access Panels
UU	Technicoat Evaporator & Condenser Coils & Coil Guard, Hinged Filter Door & Toolless Access Panels
UV	Technicoat Evaporator & Condenser Coils & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UW	Technicoat Evaporator & Condenser Coils, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
UX	Technicoat Evaporator & Condenser Coils, Phase Monitor, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UY	Technicoat Evaporator & Condenser Coils, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
UZ	Technicoat Evaporator & Condenser Coils, Phase Monitor, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
U1	Technicoat Condenser & SS Drain Pan, Hinged Filter Door & Toolless Access Panels
U2	Technicoat Condenser & Double Wall, Hinged Filter Door & Toolless Access Panels
U3	Technicoat Condenser Coil, SS Drain Pan, Double Wall, Phase Monitor, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
U4	Technicoat Evaporator & SS Drain Pan, Hinged Filter Door & Toolless Access Panels
U5	Technicoat Evaporator & Double Wall, Hinged Filter Door & Toolless Access Panels
U6	Technicoat Evaporator Coil, SS Drain Pan, Double Wall, Phase Monitor, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
U7	Technicoat Evaporator & Condenser Coils & SS Drain Pan, Hinged Filter Door & Toolless Access Panels
U8	Technicoat Evaporator & Condenser Coils & Double Wall, Hinged Filter Door & Toolless Access Panels
U9	Technicoat Evaporator & Condenser Coils, SS Drain Pan, Double Wall, Phase Monitor, Coil Guard, & Dirty Filter Switch, Hinged Filter Door & Toolless Access Panels
QA	Simplicity Intelli-Comfort Controller with Hinged Filter Door & Toolless Access Panels
QB	Simplicity Intelli-Comfort Controller, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
QC	Simplicity Intelli-Comfort Controller, & Coil Guard, Hinged Filter Door & Toolless Access Panels
QD	Simplicity Intelli-Comfort Controller, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
QE	Simplicity Intelli-Comfort Controller, & Technicoat Cond. Coil, Hinged Filter Door & Toolless Access Panels
QF	Simplicity Intelli-Comfort Controller, Technicoat Cond. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
QG	Simplicity Intelli-Comfort Controller, Technicoat Cond. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
QH	Simplicity Intelli-Comfort Controller, Technicoat Cond. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access
QJ	Simplicity Intelli-Comfort Controller, & Technicoat Evap. Coil, Hinged Filter Door & Toolless Access Panels
QK	Simplicity Intelli-Comfort Controller, Technicoat Evap. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
QL	Simplicity Intelli-Comfort Controller, Technicoat Evap. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
QM	Simplicity Intelli-Comfort Controller, Technicoat Evap. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access
QN	Simplicity Intelli-Comfort Controller, & Technicoat Evap. & Cond Coils, Hinged Filter Door & Toolless Access Panels
QP	Simplicity Intelli-Comfort Controller, Technicoat Evap. & Cond Coils, & Phase Monitor, Hinged Filter Door & Toolless Access Pan
QQ	Simplicity Intelli-Comfort Controller, Technicoat Evap. & Cond Coils, & Coil Guard, Hinged Filter Door & Toolless Access Panels
QR	Simplicity Intelli-Comfort Controller, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless
QS	Simplicity Intelli-Comfort Controller, SS Drain Pan Hinged Filter Door & Toolless Access Panels
QT	Simplicity Intelli-Comfort Controller, SS Drain Pan, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
QU	Simplicity Intelli-Comfort Controller, SS Drain Pan, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
QV	Simplicity Intelli-Comfort Controller, SS Drain Pan, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
QW	Simplicity Intelli-Comfort Controller, SS Drain Pan, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
QX	Simplicity Intelli-Comfort Controller, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
QY	Simplicity Intelli-Comfort Controller, Double Wall Hinged Filter Door & Toolless Access Panels
QZ	Simplicity Intelli-Comfort Controller, Double Wall, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
Q1	Simplicity Intelli-Comfort Controller, Double Wall, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
Q2	Simplicity Intelli-Comfort Controller, Double Wall, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
Q3	Simplicity Intelli-Comfort Controller, Double Wall, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
Q4	Simplicity Intelli-Comfort Controller, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
Q5	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
Q6	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
Q7	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
Q8	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
Q9	Simplicity Intelli-Comfort Controller, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels

Additional Options - Hinged Filter Door & Toolless Access Cabinet	
XA	Intelli-Comfort w/ModLINC Controller, Hinged Filter Door & Toolless Access Panels
XB	Intelli-Comfort w/ModLINC Controller, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
XC	Intelli-Comfort w/ModLINC Controller, & Coil Guard, Hinged Filter Door & Toolless Access Panels
XD	Intelli-Comfort w/ModLINC Controller, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access Panels
XE	Intelli-Comfort w/ModLINC Controller, & Technicoat Cond. Coil, Hinged Filter Door & Toolless Access Panels
XF	Intelli-Comfort w/ModLINC Controller, Technicoat Cond. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
XG	Intelli-Comfort w/ModLINC Controller, Technicoat Cond. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
XH	Intelli-Comfort w/ModLINC Controller, Technicoat Cond. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access
XJ	Intelli-Comfort w/ModLINC Controller, & Technicoat Evap. Coil, Hinged Filter Door & Toolless Access Panels
XK	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. Coil, & Phase Monitor, Hinged Filter Door & Toolless Access Panels
XL	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. Coil, & Coil Guard, Hinged Filter Door & Toolless Access Panels
XM	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. Coil, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless Access
XN	Intelli-Comfort w/ModLINC Controller, & Technicoat Evap. & Cond Coils, Hinged Filter Door & Toolless Access Panels
XP	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. & Cond Coils, & Phase Monitor, Hinged Filter Door & Toolless Access Pan
XQ	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. & Cond Coils, & Coil Guard, Hinged Filter Door & Toolless Access Panels
XR	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard, Hinged Filter Door & Toolless
XS	Intelli-Comfort w/ModLINC Controller, SS Drain Pan Hinged Filter Door & Toolless Access Panels
XT	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
XU	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
XV	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
XW	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
XX	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
XY	Intelli-Comfort w/ModLINC Controller, Double Wall Hinged Filter Door & Toolless Access Panels
XZ	Intelli-Comfort w/ModLINC Controller, Double Wall, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
X1	Intelli-Comfort w/ModLINC Controller, Double Wall, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
X2	Intelli-Comfort w/ModLINC Controller, Double Wall, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
X3	Intelli-Comfort w/ModLINC Controller, Double Wall, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
X4	Intelli-Comfort w/ModLINC Controller, Double Wall, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
X5	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, Phase Monitor, & Coil Guard Hinged Filter Door & Toolless Access Panels
X6	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, & Technicoat Cond Coils Hinged Filter Door & Toolless Access Panels
X7	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, & Technicoat Evap Coil Hinged Filter Door & Toolless Access Panels
X8	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels
X9	Intelli-Comfort w/ModLINC Controller, Double Wall, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils Hinged Filter Door & Toolless Access Panels

INSTALLATION

INSTALLATION SAFETY INFORMATION:

Read these instructions before continuing this appliance installation. This is an outdoor combination heating and cooling unit. The installer must assure that these instructions are made available to the consumer and with instructions to retain them for future reference.

1. Refer to the furnace rating plate for the approved type of gas for this furnace.
2. Install this furnace only in a location and position as specified on Page 17 of these instructions.
3. Never test for gas leaks with an open flame. Use commercially available soap solution made specifically for the detection of leaks when checking all connections.
4. Always install furnace to operate within the furnace's intended temperature-rise range with the duct system and within the allowable external static pressure range, as specified on the unit name/rating plate.
5. This equipment is not to be used for temporary heating or cooling of buildings or structures under construction.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

LIMITATIONS

These units must be installed in accordance with the following national and local safety codes:

In U.S.A.:

- National Electrical Code ANSI/NFPA No. 70.
- National Fuel Gas Code Z223.1.
- Gas-Fired Central Furnace Standard ANSI Z21.47a.
- Local gas utility requirements.

In Canada:

- Current Canadian Electrical Code C22.1.
- Current Gas Installation Codes CSA-B149.1.
- Local plumbing and waste water codes.
- Other applicable local codes.

Refer to the Unit Application Data Table 1 and to the Gas Heat Application Data Table 4.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or the customer's expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculation made according to the methods of the Air Conditioning Contractors of America (ACCA).

TABLE 1: UNIT APPLICATION DATA

UNIT MODEL NUMBER		DR180	DR240	DR300
Voltage Variation, Min. / Max.[1]	208/230-3-60	187/253		
	460-3-60	414/506		
	575-3-60	518/630		
Supply Air CFM, Min. / Max.		4,500/ 7,500	6,000/ 9,400	7,500/ 11,500
Wet Bulb Temperature (ºF) of Air on Evaporator Coil, Min. / Max.		57/72		
Dry Bulb Temperature (ºF) of Air on Condenser Coil, Min. / Max.		0/125		

1. Utilization range “A” in accordance with ARI Standard 110.

LOCATION

Use the following guidelines to select a suitable location for these units.

1. Unit is designed for outdoor installation only.
2. Condenser coils must have an unlimited supply of air.
3. Where a choice of location is possible, position the unit on either north or east side of building.
4. For ground level installation, use a level concrete slab with a minimum thickness of 4 inches. The length and width should be at least 6 inches greater than the unit base rails. Do not tie slab to the building foundation.
5. Roof structures must be able to support the weight of the unit and its options and/or accessories. Unit must be installed on a solid level roof curb or appropriate angle iron frame.

6. Maintain level tolerance to 1/2 inch maximum across the entire length or width of the unit.

⚠WARNING

Excessive exposure of this furnace to contaminated combustion air may result in equipment damage or personal injury. Typical contaminates include: permanent wave solutions, chlorinated waxes and cleaners, chlorine based swimming pool chemicals, water softening chemicals, carbon tetrachloride, Halogen type refrigerants, cleaning solvents (e.g. perchloroethylene), printing inks, paint removers, varnishes, hydrochloric acid, cements and glues, antistatic fabric softeners for clothes dryers, masonry acid washing materials.

If a unit is to be installed on a roof curb or special frame other than a YORK roof curb, gasketing must be applied to all surfaces that come in contact with the unit underside.

RIGGING AND HANDLING

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the round lifting holes provided in the base rails. Spreaders, whose length exceeds the largest dimension across the unit, MUST BE USED. Refer to Figure 1.

Units may also be moved or lifted with a forklift, from the **side only**, providing that an accessory skid is used. LENGTH OF FORKS MUST BE A MINIMUM OF 90".

Refer to the Physical Data Table 7 for unit weights and to the Figures 2 or 12 for approximate center of gravity.

⚠ CAUTION

Before lifting a unit, make sure that all panels are in place and that its weight is distributed equally on all cables so it will lift evenly.

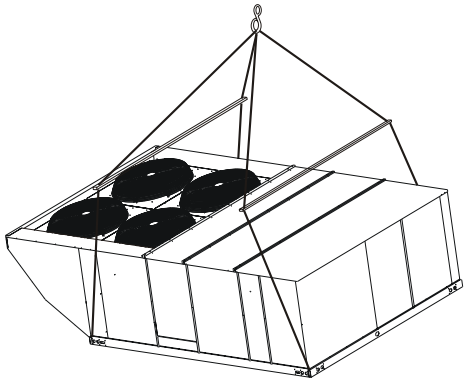


FIGURE 1 - TYPICAL RIGGING

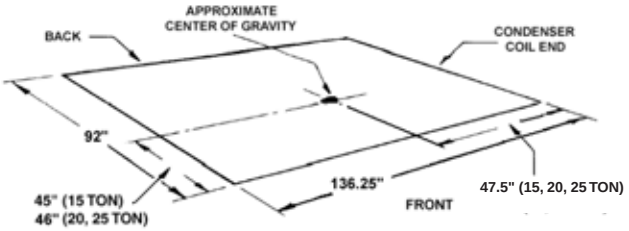


FIGURE 2 - CENTER OF GRAVITY

CLEARANCES

All units require certain clearances for proper operation and service. Installer must make provisions for adequate combustion and ventilation air in accordance with Section 5.3, Air for Combustion and Ventilation of the National Fuel Gas Code, ANSI Z223.1 (in U.S.A.) or Sections 7.2, 7.3 or 7.4 of Gas Installation Codes CSA-B149.1 (in Canada) and/or applicable provisions of the local building codes. Refer to Dimensions and Clearances Figure 12 for the clearances required for combustible construction, servicing, and proper unit operation.

⚠WARNING

Do not permit overhanging structures or shrubs to obstruct outdoor air discharge outlet, combustion air inlet or vent outlets.

DUCTWORK

Ductwork should be designed and sized according to the methods in Manual Q of the Air Conditioning Contractors of America (ACCA).

A closed return duct system shall be used. This shall not preclude use of economizers or outdoor fresh air intake. The supply and return air duct connections at the unit should be made with flexible joints to minimize noise.

The supply and return air duct systems should be designed for the CFM and static requirements of the job. They should NOT be sized to match the dimensions of the duct connections on the unit.

⚠ CAUTION

When fastening ductwork to side duct flanges on unit, insert screws through duct flanges only. DO NOT insert screws through casing. Outdoor ductwork must be insulated and waterproofed.

Refer to Dimensions and Clearances Figure 12 for information concerning side and bottom supply and return air duct openings.

NOTE: It is recommended that, in Canada, the outlet duct be provided with a removable access panel. It is recommended that this opening be accessible when the unit is installed in service, and of a size such that smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heat exchanger. The cover should be attached in a manner adequate to prevent leakage.

FIXED OUTDOOR AIR INTAKE DAMPER

This damper is shipped inside the return air compartment. It is completely assembled and ready for installation. A damper baffle inside of the hood is adjustable to provide variable amounts of outdoor air intake on units that are not provided with an economizer or a motorized damper option. Refer to the Fixed Outdoor Damper Figure 3.

Gasketing and mounting screws are provided in a parts bag attached to the hood assembly. Apply gasketing to the three flange surfaces on the hood prior to installing the hood. Extend gasketing 1/4 inch beyond the top and bottom of the two side flanges to insure adequate sealing.

Adjusting the damper to the desired air flow may be done before mounting the hood into position or after installation by removing the front hood panel or the screen on the bottom of the hood. Damper baffle in position 1 will allow approximately 10% outdoor air flow, position 2 approximately 15% and, to allow approximately 25%, remove the damper baffle.

On units with bottom return air application install the damper assembly over the opening in the side return air access panel. Remove and discard the opening cover and the covering over the hood mounting holes (used for shipping) before installing. Secure with the screws provided.

On units with side return air applications, install the damper assembly on the return air ductwork as close to the unit as possible. Cut an opening 16 inches high by 18 inches wide in the ductwork to accommodate the damper. Using the holes in the hood flanges as a template, drill 9/64 inch dia. (#26 drill) holes into the ductwork and secure with the screws provided.

⚠ CAUTION

If outdoor air intake will not be required on units with bottom return air applications, the damper assembly should still be mounted on the side return air access panel, per the instructions above, to insure moisture is not drawn into the unit during operation. The covering over the mounting holes only need be removed. Do not remove the opening cover.

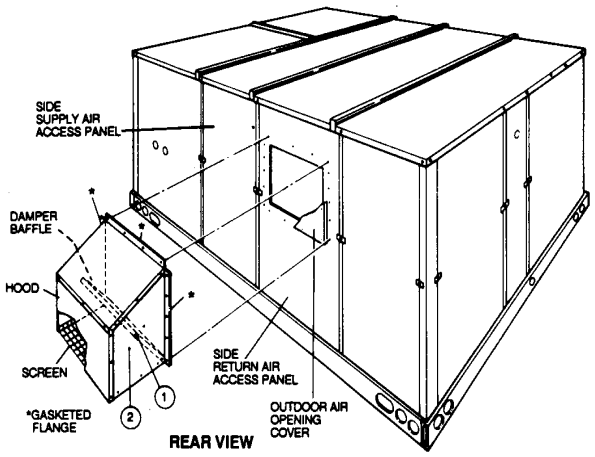


FIGURE 3 - FIXED OUTDOOR AIR DAMPER

CONDENSATE DRAIN

Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install a condensate drain line from the one-inch NPT female connection on the unit to an open drain.

NOTE: The condensate drain operates in a negative pressure in the cabinet. The condensate drain line MUST be trapped to provide proper drainage. See Figure 4.

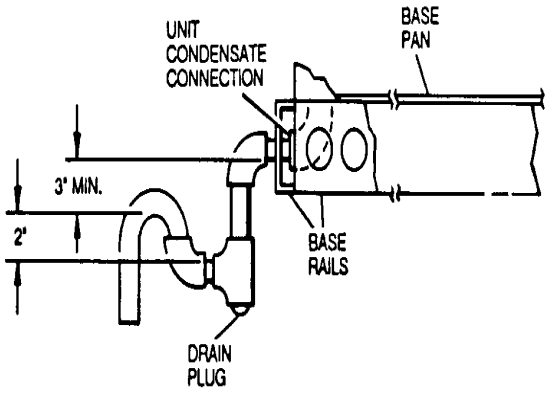


FIGURE 4 - RECOMMENDED DRAIN PIPING

COMPRESSORS

Units are shipped with compressor mountings factory-adjusted and ready for operation.

⚠ CAUTION

Do not loosen compressor mounting bolts.

FILTERS

Two-inch filters are supplied with each unit, but units can be converted easily to four-inch filters. Filters must always be installed ahead of the evaporator coil and must be kept clean or replaced with same size and type. Dirty filters will reduce the capacity of the unit and will result in frosted coils or safety shutdown. Minimum filter area and required sizes are shown in Physical Data Table 7.

SERVICE ACCESS

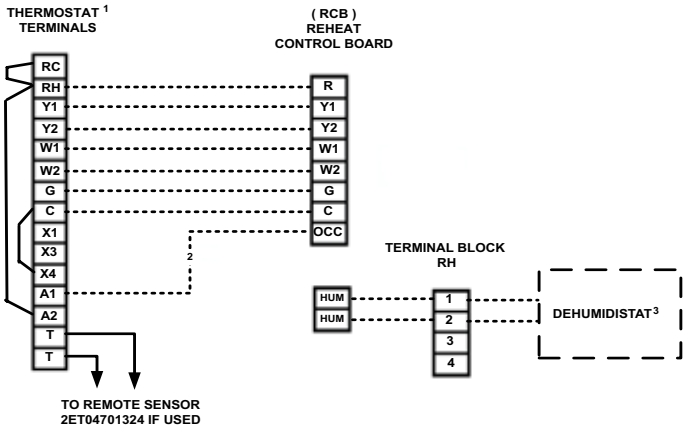
The following removable panels provide access to all serviceable components:

- Compressor compartment
- Electric Heat compartment
- Gas Heat compartment (Two panels)
- Side Supply & Return Air compartments (Two panels)
- Blower compartment (Three panels)
- Main control box
- Filter compartment
- Outdoor Air compartment (Two panels)

Refer to the Dimensions and Clearances Figure 12 for location of these access panels.

⚠ CAUTION

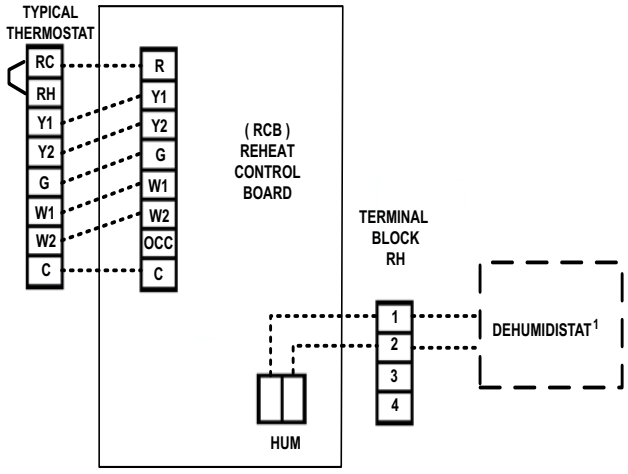
Make sure that all screws and panel latches are replaced and properly positioned on the unit to maintain an airtight seal.



[1] Electronic programmable Thermostat 2ET0770010024 (includes subbase).

[2] Terminals A1 and A2 provide a relay output to close the outdoor economizer dampers when the thermostat switches to the set-back position.

[3] Dehumidistat closes on rise in humidity.



[1] Dehumidistat closes on rise in humidity.

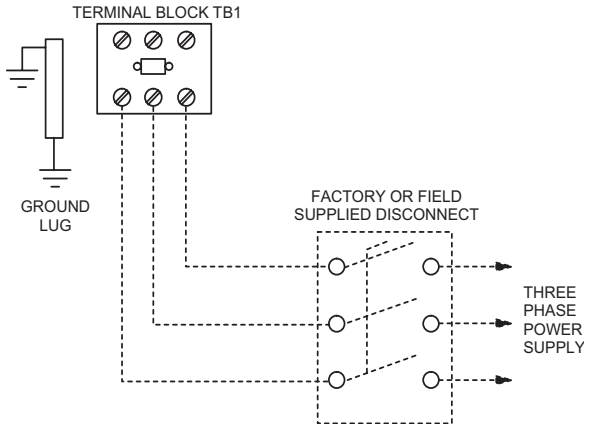


FIGURE 5 - TYPICAL FIELD WIRING

THERMOSTAT

The room thermostat should be located on an inside wall approximately 56 inches above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Follow the manufacturer's instructions enclosed with the thermostat for general installation procedure. A minimum of seven color-coded insulated wires (#18 AWG) should be used to connect the thermostat to the unit.

POWER AND CONTROL WIRING

Field wiring to the unit must conform to provisions of the National Electrical Code, ANSI / NFPA No. 70 (in U.S.A.), current Canadian Electrical Code C22.1 (in Canada) and/or local ordinances. The unit must be electrically grounded in accordance with NEC and CEC (as specified above) and/or local codes. Voltage tolerances, which must be maintained at the compressor terminals, during starting and running conditions, are indicated on the unit Rating Plate and the Unit Application Data table.

The internal wiring harness furnished with this unit is an integral part of a CSA design certified unit. Field alteration to comply with electrical codes should not be required.

A fused disconnect switch should be field provided for the unit. The switch must be separate from all other circuits. Wire entry at knockout openings require conduit fittings to comply with NEC (in U.S.A.), CEC (in Canada) and/or local codes. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire.

Use copper conductors properly sized to carry the load. Each unit must be wired with a separate branch circuit fed directly from the meter panel and properly fused.

⚠ CAUTION

When connecting electrical power and control wiring to the unit, waterproof type connectors **MUST BE USED** so that water or moisture cannot be drawn into the unit during normal operation. The above waterproofing conditions will also apply when installing a field-supplied disconnect switch.

Refer to the Typical Field Wiring Figure 5 and to the appropriate unit wiring diagram for control circuit and power wiring information.

TABLE 2: CONTROL WIRE SIZES

Wire Size	Maximum Length[1]
18 AWG	150 Feet

1. From the unit to the thermostat and back to the unit.

OPTIONAL ELECTRIC HEAT

The factory-installed heaters are wired for single point power supply. Power supply need only be brought into the single point terminal block and thermostat wiring to the low voltage terminal strip located in the upper portion of the unit control box.

These CSA approved heaters are located within the central compartment of the unit with the heater elements extending into the supply air chamber. Refer to Figure 13 for access panel location.

Fuses are supplied, where required, by the factory. Some KW sizes require fuses and others do not. Refer to Table 3 for minimum CFM limitations and to Tables 8 and 9 for electrical data.

TABLE 3: ELECTRIC HEAT APPLICATION DATA

NOMINAL HEATER SIZE (KW)	VOLTAGE 3-PHASE, 60 HZ	MINIMUM CFM UNIT SIZE		
		15 TON	20 TON	25 TON
18	208/230,460,575	4500	6000	7500
36	208/230,460,575	4500		
54	208/230	5000		
	460,575	4500		
72	208/230	5000		
	460,575	4500		

OPTIONAL GAS HEAT

These gas-fired heaters have aluminized-steel or optional stainless steel, tubular heat exchangers with spark ignition with proven pilot.

All gas heaters are shipped from the factory equipped for natural gas use, but can be field converted to L.P./ Propane with Kit Model # 1NP0418. See Gas Heat Application Data Table.

TABLE 4: GAS HEAT APPLICATION DATA

0 To 2,000 Feet Above Sea Level		2,000 To 4,500 Feet Above Sea Level		Output Capacity (Mbh)		Available on Models	Natural Gas Rate (Ft./Hr.)	Temp. Rise ºF At Full Input	
				0 To 2,000 Feet Above Sea Level	2,000 To 4,500 Feet Above Sea Level				
Max.	Min.	Max.	Min.	Max.	Max.			Min.	Max.
300	150	270	135	240	213	15, 20 & 25 Ton	279	20	50
400	200	360	180	320	281	15, 20 & 25 Ton	372	30	60

GAS PIPING

Proper sizing of gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas and the length of run. "National Fuel Gas Code" Z223.1 (in U.S.A.) or the current Gas Installation Codes CSA-B149.1 (in Canada) should be followed in all cases unless superseded by local codes or gas utility requirements. Refer to the Pipe Sizing Table 5.

The heating value of the gas may differ with locality. The value should be checked with the local gas utility.

NOTE: There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a one-inch pipe connection at the entrance fitting.

TABLE 5: PIPE SIZING

Length in Feet	Nominal Iron Pipe Size	
	1 in.	1-1/4 in.
10	520	1,050
20	350	730
30	285	590
40	245	500
50	215	440
60	195	400
70	180	370
80	170	350
90	160	320
100	150	305

Maximum capacity of pipe in cubic feet of gas per hour. (Based upon a pressure drop of 0.3 inch water column and 0.6 specific gravity gas).

GAS CONNECTION

The gas supply line can be routed through the knockouts located on the front of the unit or through the opening provided in the unit's base. Refer to the Dimensions and Clearances Figure 13 to locate these access openings. Typical supply piping arrangements are shown in the figures on page 24. All shaded items are field-supplied.

If gas supply line is routed through the unit's base ensure that the burner assembly can be removed for maintenance without disturbing the supply line. The supply piping and fittings must lie below the bottom gas manifold to avoid interference with the burner assembly.

Two grommets are shipped in the blower compartment (in parts bag taped to the blower housing) of every unit with gas heat and should be used in the knockouts when the gas piping penetrates the front of the unit.

After the gas supply piping has been installed, the bottom opening in the unit should be sealed to prevent water from leaking into the building.

Gas piping recommendations:

1. A drip leg and a ground joint union must be installed in the gas piping.
2. When required by local codes, a manual shut-off valve may have to be installed outside of the unit.
3. Use wrought iron or steel pipe for all gas lines. Pipe compound should be applied sparingly to male threads only.

⚠WARNING

Natural gas may contain some propane. Propane, being an excellent solvent, will quickly dissolve white lead or most standard commercial compounds. Therefore, a special pipe compound must be applied when wrought iron or steel pipe is used. Shellac base compounds such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clyde's or John Crane may be used.

4. All piping should be cleaned of dirt and scale by hammering on the outside of the pipe and blowing out the loose dirt and scale. Before initial start-up, be sure that all of the gas lines external to the unit have been purged of air.

5. The gas supply should be a separate line and installed in accordance with all safety codes as prescribed under "Limitations". After the gas connections have been completed, open the main shut-off valve admitting normal gas pressure to the mains. Check all joints for leaks with soap solution or other material suitable for the purpose. NEVER USE A FLAME.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. Use a commerically available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

6. The furnace and its individual manual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.48kPa).

   The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (3.48kPa).

7. A 1/8 inch NPT plugged tap, accessible for test gage connection, must be installed immediately upstream of the gas supply connection to the furnace.

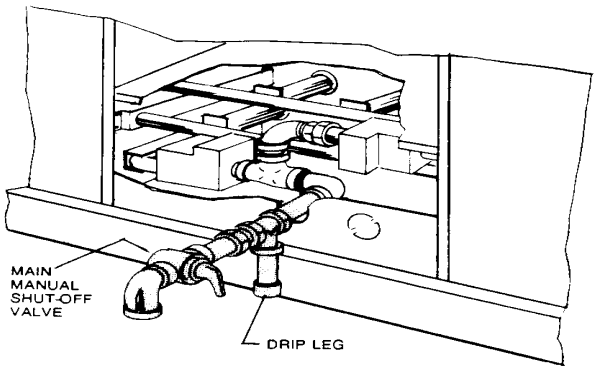


FIGURE 6 - EXTERNAL SUPPLY CONNECTION EXTERNAL SHUT-OFF

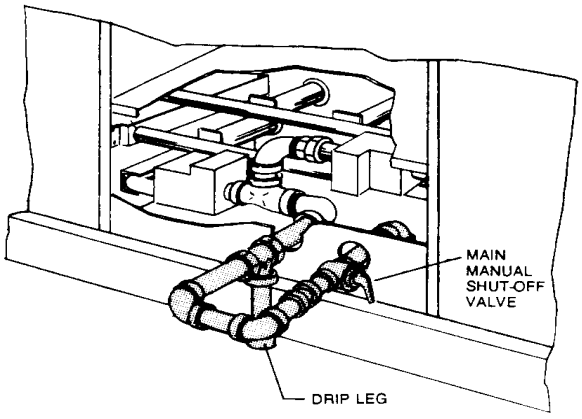


FIGURE 7 - BOTTOM SUPPLY CONNECTION EXTERNAL SHUT-OFF

L.P. UNITS, TANKS AND PIPING

All gas heat units are shipped from the factory equipped for natural gas use only. The unit may be converted in the field for use with L.P./propane gas with accessory kit model number 1NP0418.

All L.P./propane gas equipment must conform to the safety standards of the National Fire Protection Association.

For satisfactory operation, L.P./propane gas pressure must be 8.8 I.W.C. at the unit manifold under full load. Maintaining proper gas pressure depends on three main factors:

1. The vaporization rate depends on (a) the temperature of the liquid and (b) the "wetted surface" area of the container or containers.
2. The proper pressure regulation. (Two-stage regulation is recommended from the standpoint of both cost and efficiency.)
3. The pressure drop in the lines between regulators and between the second stage regulator and the appliance. Pipe size required will depend on the length of the pipe run and the total load of all appliances.

Complete information regarding tank sizing for vaporization, recommended regulator settings, and pipe sizing is available from most regulator manufacturers and L.P./propane gas suppliers.

L.P./propane gas is an excellent solvent and special pipe compound must be used when assembling piping for this gas as it will quickly dissolve white lead or most standard commercial compounds. Shellac base compounds such as Rectorseal #5 are satisfactory for this type of gas.

Check all connections for leaks when piping is completed, using a soap solution. **NEVER USE A FLAME**.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. Use a commerically available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

VENT AND COMBUSTION AIR HOODS

Two vent hoods and a combustion air hood (with screens) are shipped attached to the blower housing in the blower compartment. These hoods must be installed to assure proper unit function. All hoods must be fastened to the outside of the gas heat access panel with the screws provided in the bag also attached to the blower housing.

The screen for the combustion air intake hood is secured to the inside of the access panel opening with four fasteners and the screws used for mounting the hood to the panel. The top flange of this hood slips in under the top of the access panel opening when installing. Refer to Vent and Combustion Air Hood Figure 8.

Each vent hood is installed by inserting the top flange of the hood into the slotted opening in the access panel and securing in place.

The products of combustion are discharged horizontally through these two screened, hooded vent openings on the upper gas heat access panel.

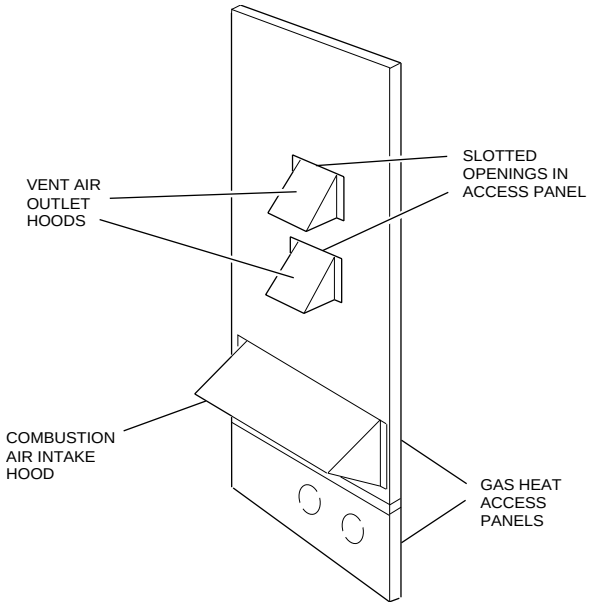


FIGURE 8 - VENT AND COMBUSTION AIR HOOD

⚠ CAUTION

An adhesive backed label is provided over the outside of the combustion air inlet opening to prevent moisture from entering the unit, which could cause damage to electrical components. Allow this closure label to remain in place until the combustion air hood is to be installed.

OPTIONAL ECONOMIZER/MOTORIZED DAMPER RAIN HOOD

The instruction for the optional economizer/motorized damper rain hood can be found in form 035-19854-000. Use these instructions when field assembling an economizer rain hood onto a unit. The outdoor and return air dampers, the damper actuator, the damper linkage, the outdoor and return air divider baffles, and all the control sensors are factory mounted as part of the "Factory installed" economizer option.

OPTIONAL POWER EXHAUST/BAROMETRIC RELIEF DAMPER AND RAIN HOOD

The instructions for the power exhaust/barometric relief damper and rain hood can be found in form 035-19856-000. The exhaust fan, all supporting brackets, angles, and the wiring are factory installed as part of the power exhaust option.

All of the components, including the dampers, hardware, and mounting instructions are shipped in a single package external from the unit. The hood must be field assembled and installed.

Power exhaust is not available as a field installed option.

OPTIONAL ECONOMIZER AND POWER EXHAUST DAMPER SETPOINT ADJUSTMENTS AND INFORMATION

Remove the economizer access panel from the unit. Loosen but do not remove the two panel latches. Locate the economizer control module, where the following adjustments will be made.

⚠ CAUTION

Extreme care must be excercised in turning all setpoint, maximum, and minimum damper positioning adjustment screws to prevent twisting them off.

Check that the damper blades move smoothly without binding; carefully turn the Minimum Position Adjusting screw (found on the damper control module) fully clockwise and then set the thermostat indoor fan switch to the on position and then off, or energize and de-energize terminals "R" to "G".

MINIMUM POSITION ADJUSTMENT

With thermostat set to indoor fan on position, or terminals "R" to "G" energized, turn the Minimum Position Adjusting screw (located on the damper control module) counterclockwise until the desired minimum damper position has been attained.

ENTHALPY SETPOINT ADJUSTMENT

The enthalpy setpoint may now be set by selecting the desired setpoint shown in the Enthalpy Setpoint Adjustment Figure 9. Adjust as follows:

- For a single enthalpy operation carefully turn the setpoint adjusting screw (found on the damper control module) to the "A", "B", "C" or "D" setting corresponding to the lettered curve of the Enthalpy Setpoint Adjustment Figure 9.
- For a dual enthalpy operation, carefully turn the setpoint adjusting screw fully clockwise past the "D" setting.

POWER EXHAUST DAMPER SETPOINT (WITH OR WITHOUT POWER EXHAUST)

- With no power exhaust option, adjust the Exhaust Air Adjustment Screw fully clockwise. This will allow 2nd stage cooling to operate.
- With power exhaust option, each building pressurization requirement will be different. The point at which the power exhaust comes on is determined by the economizer damper position (Percent Open). The Exhaust Air Adjustment Screw should be set at the Percent Open of the economizer damper at which the power exhaust is needed. It can be set from 0 to 100% damper open.

INDOOR AIR QUALITY

Indoor Air quality (indoor sensor input): Terminal AQ accepts a +2 to +10 Vdc signal with respect to the (AQ1) terminal. When the signal is below it's setpoint, the actuator is allowed to modulate normally in accordance with the enthalpy and mixed air sensor inputs. When the AQ signal exceeds it's setpoint setting and there is no call for free cooling, the actuator is proportionately modulated from the 2 to 10 Vdc signal, with 2 Vdc corresponding to full closed and 10 Vdc corresponding to full open. When there is no call for free cooling, the damper position is limited by the IAQ Max damper position setting. When the signal exceeds it's setpoint (Demand Control Ventilation Setpoint) setting and there is a call for free cooling, the actuator modulates from the minimum position to the full open position based on the highest call from either the mixed air sensor input or the AQ voltage input.

- Optional CO_2 Space Sensor Kit Part # 2AQ04700224
- Optional CO_2 Sensor Kit Part # 2AQ04700124

Replace the economizer access panel.

CONTROL CURVE	CONTROL POINT APPROX. ^{0}F (^{0}C) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)

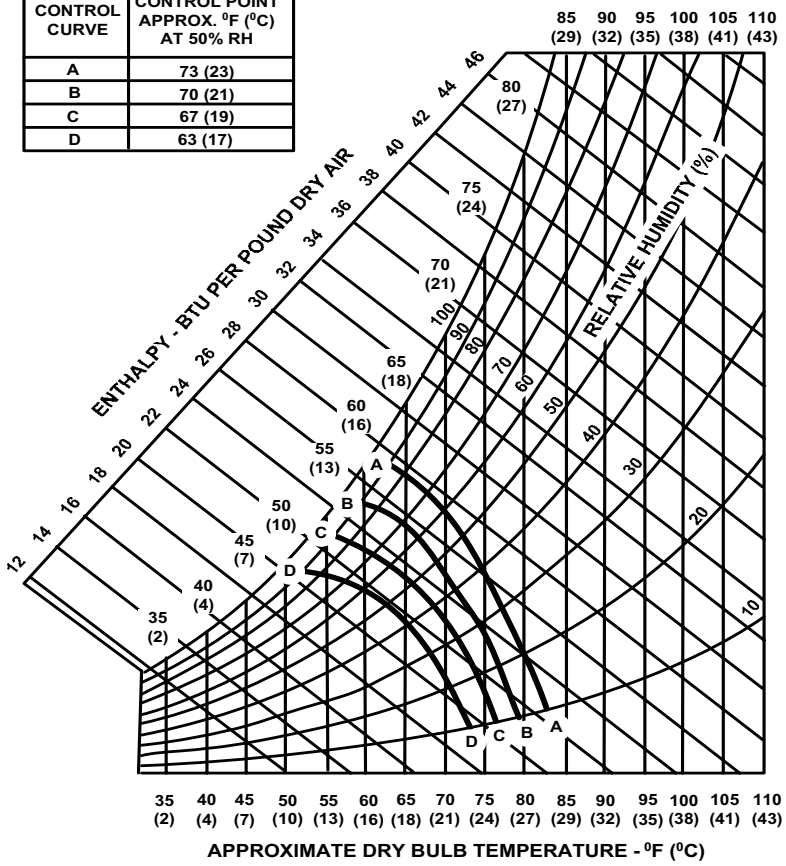


FIGURE 9 - ENTHALPY SETPOINT ADJUSTMENT

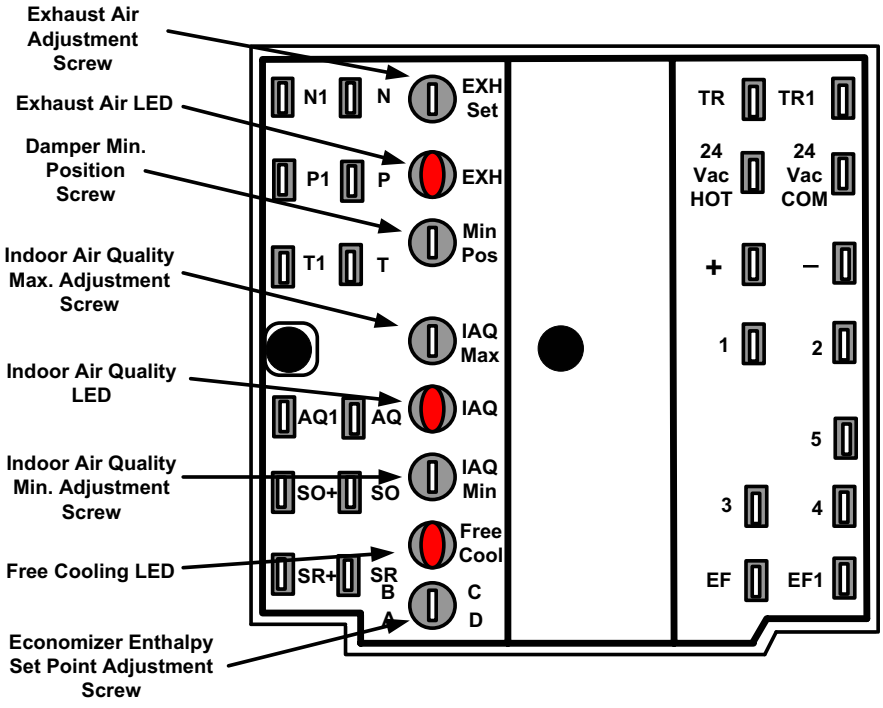


FIGURE 10 - HONEYWELL ECONOMIZER CONTROL W7212

TABLE 6: FOUR AND SIX POINT LOADS

Unit Size	Operating Weight[1]	4 Point Loads (lbs)			
		A	B	C	D
180 Gas	2850	486	908	948	508
240 Gas	3150	549	1026	1026	549
300 Gas	3250	567	1058	1058	567
180 Elec	2650	452	844	882	472
240 Elec	2950	514	961	961	514
300 Elec	3050	532	993	993	532

Unit Size	Operating Weight[1]	6 Point Loads (lbs)					
		A	B	C	D	E	F
180 Gas	2850	324	338	485	632	605	465
240 Gas	3150	366	366	525	684	684	525
300 Gas	3250	378	378	542	706	706	542
180 Elec	2650	301	315	451	588	563	432
240 Elec	2950	343	343	492	641	641	492
300 Elec	3050	354	354	508	662	662	508

1. Weight includes unit, economizer, economizer rain hood and high option heat (gas or electric).

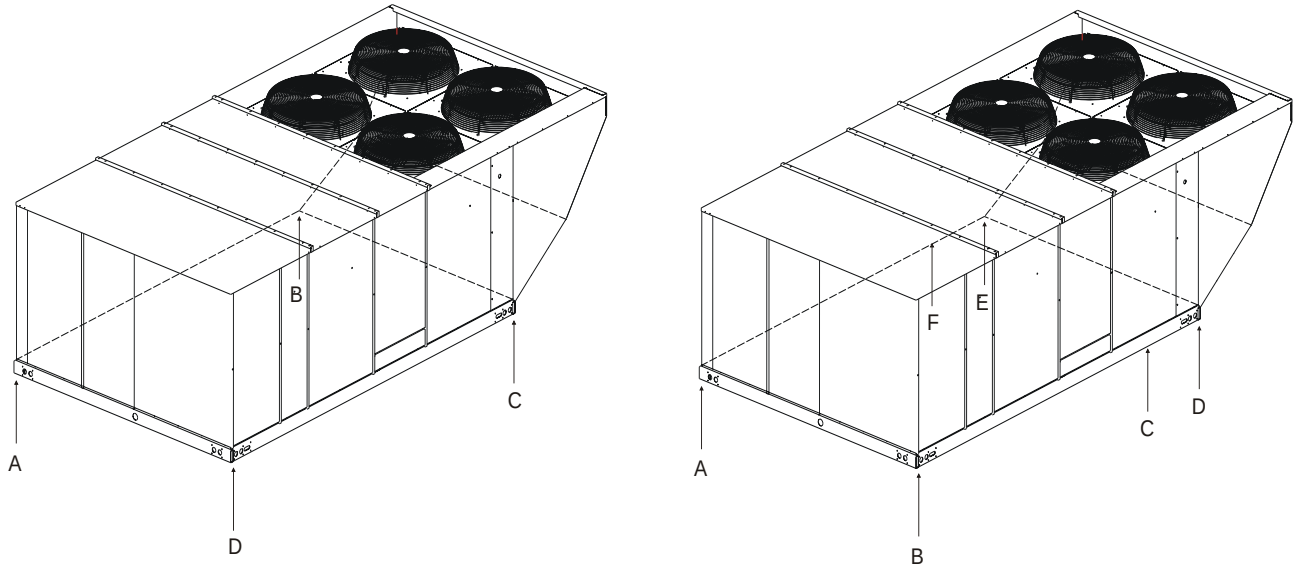


FIGURE 11 - FOUR AND SIX POINT LOADS

TABLE 7: PHYSICAL DATA

MODELS				DR 180	DR 240	DR 300
EVAPORATOR BLOWER	CENTRIFUGAL BLOWER (Dia. x Wd.)			15x15	18x15	
	FAN MOTOR HP			5/7.5	7.5/10	15.0
EVAPORATOR COIL	ROWS DEEP			4		
	FINS PER INCH			13.5		
	FACE AREA (Sq. Ft.)			20		20.52
CONDENSER FAN (FOUR PER UNIT)	PROPELLER DIA. (In.)		(Each)	24	30	
	FAN MOTOR HP		(Each)	1/3	3/4	
	NOM. CFM TOTAL		(Each)	4,000	5,000	
CONDENSER COIL	ROWS DEEP			2		
	FINS PER INCH			20		
	FACE AREA (Sq. Ft.)			63.8		
REHEAT COIL	ROWS DEEP			2		
	FINS PER INCH			13		
	FACE AREA (Sq. Ft.)			17.2		
COMPRESSOR (QTY. PER UNIT)	SCROLL			2		
FILTERS	QUANTITY PER UNIT (16” X 25” X 2”)			4		
	QUANTITY PER UNIT (16” X 20” X 2”)			4		
	TOTAL FACE AREA (Sq. Ft.)			20		
CHARGE	REFRIGERANT 22 (Lb./Oz.)	SYSTEM No. 1		22/8	27/0	25/0
		SYSTEM No. 2		22/0	27/0	24/8
OPERATING WEIGHTS (LBS.)	BASIC UNIT	COOLING ONLY		2360	2660	2760
		GAS / ELECTRIC	N24	2560	2860	2960
			N32	2600	2900	3000
	OPTIONS	DOUBLE WALL		260		
		ECONOMIZER		160		
		ECONOMIZER WITH POWER EXHAUST		245		
		MOTORIZED DAMPER		150		
		ELECTRIC HEATER	18 KW	25		
			36 KW	30		
			54 KW	35		
			72 KW	40		
	ACCESSORIES	ROOF CURB		185		
		BAROMETRIC DAMPER		45		
		ECONOMIZER / MOTORIZED DAMPER RAIN HOOD		55		
		ECONOMIZER / POWER EXHAUST RAIN HOOD		90		
		WOOD SKID		220		

TABLE 8: DR ELECTRICAL DATA - STANDARD DRIVE MOTOR W/O POWERED CONVENIENCE OUTLET

MODEL TONNAGE	VOLTAGE	COMPRESSORS		OD FAN MOTORS FLA EACH	ID BLOWER MOTOR FLA	CONV OUTLET AMPS	HEATER OPTION				MIN. CIRCUIT AMPACITY (AMPS)	MAX. FUSE/ BRKR[1] SIZE (AMPS)
		RLA EACH	LRA EACH				MODEL	KW	STAGES	AMPS		
15	208	22.4	164	2.1	15.4	0.0	None	0.0	-	-	74.2	90
							E18	13.5	1	37.5	74.2	90
							E36	27.0	2	75.1	112.9	125
							E54	40.6	2	112.6	160.1	175
							E72	54.1	2	150.1	169.4	200
	230	22.4	164	2.1	15.4	0.0	None	0.0	-	-	73.2	90
							E18	18.0	1	43.3	73.2	90
							E36	36.0	2	86.6	126.3	150
							E54	54.0	2	129.9	147.9	175
							E72	72.0	2	173.2	191.2	225
	460	10.9	100	1.1	7.2	0.0	None	0.0	-	-	36.1	45
							E18	18.0	1	21.7	36.1	45
							E36	36.0	2	43.3	63.1	70
							E54	54.0	2	65.0	74.0	90
							E72	72.0	2	86.6	95.6	110
	575	8.3	78	0.9	5.9	0.0	None	0.0	-	-	28.2	35
							E18	18.0	1	17.3	29.0	35
							E36	36.0	2	34.6	50.7	60
							E54	54.0	2	52.0	59.3	70
							E72	72.0	2	69.3	76.7	90
20	208	33.6	225	3.7	20.0	0.0	None	0.0	-	-	110.4	125
							E18	13.5	1	37.5	110.4	125
							E36	27.0	2	75.1	118.7	125
							E54	40.6	2	112.6	165.9	175
							E72	54.1	2	150.1	175.2	200
	230	33.6	225	3.7	20.0	0.0	None	0.0	-	-	110.4	125
							E18	18.0	1	43.3	110.4	125
							E36	36.0	2	86.6	133.3	150
							E54	54.0	2	129.9	154.9	175
							E72	72.0	2	173.2	198.2	225
	460	17.3	114	1.9	10.0	0.0	None	0.0	-	-	56.5	70
							E18	18.0	1	21.7	56.5	70
							E36	36.0	2	43.3	66.6	70
							E54	54.0	2	65.0	77.5	90
							E72	72.0	2	86.6	99.1	110
	575	13.5	80	1.5	8.2	0.0	None	0.0	-	-	44.6	50
							E18	18.0	1	17.3	44.6	50
							E36	36.0	2	34.6	53.6	60
							E54	54.0	2	52.0	62.2	70
							E72	72.0	2	69.3	79.5	90
25	208	47.1	245	3.7	38.6	0.0	None	0.0	-	-	159.4	200
							E18	13.5	1	37.5	159.4	200
							E36	27.0	2	75.1	159.4	200
							E54	40.6	2	112.6	189.1	200
							E72	54.1	2	150.1	198.4	225
	230	47.1	245	3.7	38.6	0.0	None	0.0	-	-	159.4	200
							E18	18.0	1	43.3	159.4	200
							E36	36.0	2	86.6	159.4	200
							E54	54.0	2	129.9	178.2	200
							E72	72.0	2	173.2	221.5	250
	460	19.6	125	1.9	19.3	0.0	None	0.0	-	-	71.0	90
							E18	18.0	1	21.7	71.0	90
							E36	36.0	2	43.3	78.3	90
							E54	54.0	2	65.0	89.1	100
							E72	72.0	2	86.6	110.7	125
	575	15.8	100	1.5	15.4	0.0	None	0.0	-	-	57.0	70
							E18	18.0	1	17.3	57.0	70
							E36	36.0	2	34.6	62.6	70
							E54	54.0	2	52.0	71.2	80
							E72	72.0	2	69.3	88.5	100

NOTE 1: HACR Type per NEC.

VOLTAGE LIMITATIONS				ELECTRIC HEAT CORRECTION FACTORS		
	POWER SUPPLY	VOLTAGE		NOMINAL VOLTAGE	VOLTAGE	kW CAP. MULTIPLIER
		MIN.	MAX.	208	208	1.00
VOLTAGE LIMITATIONS[1]	208/230-3-60	187	253	240	230	0.92
	460-3-60	414	506	480	460	0.92
	565-3-60	518	630	600	575	0.92

1. Utilization Range “A” in accordance with ARI Standard 110.

TABLE 9: DR ELECTRICAL DATA - HIGH STATIC DRIVE MOTOR W/O POWERED CONVENIENCE OUTLET

MODEL TONNAGE	VOLTAGE	COMPRESSORS		OD FAN MOTORS FLA EACH	ID BLOWER MOTOR FLA	CONV OUTLET AMPS	HEATER OPTION				MIN. CIRCUIT AMPACITY (AMPS)	MAX. FUSE/ BRKR[1] SIZE (AMPS)
		RLA EACH	LRA EACH				MODEL	KW	STAGES	AMPS		
15	208	22.4	164	2.1	20	0.0	None	0.0	-	-	78.8	100
							E18	13.5	1	37.5	78.8	100
							E36	27.0	2	75.1	118.7	125
							E54	40.6	2	112.6	165.9	175
							E72	54.1	2	150.1	175.2	200
	230	22.4	164	2.1	20	0.0	None	0.0	-	-	78.8	100
							E18	18.0	1	43.3	79.1	100
							E36	36.0	2	86.6	133.3	150
							E54	54.0	2	129.9	154.9	175
							E72	72.0	2	173.2	198.2	225
	460	10.9	100	1.1	10	0.0	None	0.0	-	-	38.9	45
							E18	18.0	1	21.7	39.6	45
							E36	36.0	2	43.3	66.6	70
							E54	54.0	2	65.0	77.5	90
							E72	72.0	2	86.6	99.1	110
	575	8.3	78	0.9	8.2	0.0	None	0.0	-	-	30.5	35
							E18	18.0	1	17.3	31.9	35
							E36	36.0	2	34.6	53.6	60
							E54	54.0	2	52.0	62.2	70
							E72	72.0	2	69.3	79.5	90
20	208	33.6	225	3.7	28	0.0	None	0.0	-	-	117	150
							E18	13.5	1	37.5	117	150
							E36	27.0	2	75.1	126.9	150
							E54	40.6	2	112.6	174.1	175
							E72	54.1	2	150.1	183.4	200
	230	33.6	225	3.7	26.6	0.0	None	0.0	-	-	117	150
							E18	18.0	1	43.3	117	150
							E36	36.0	2	86.6	141.5	150
							E54	54.0	2	129.9	163.2	175
							E72	72.0	2	173.2	206.5	225
	460	17.3	114	1.9	13.3	0.0	None	0.0	-	-	59.8	70
							E18	18.0	1	21.7	59.8	70
							E36	36.0	2	43.3	70.8	80
							E54	54.0	2	65.0	81.6	90
							E72	72.0	2	86.6	103.2	110
	575	13.5	80	1.5	10.3	0.0	None	0.0	-	-	46.7	60
							E18	18.0	1	17.3	46.7	60
							E36	36.0	2	34.6	56.2	60
							E54	54.0	2	52.0	64.8	70
							E72	72.0	2	69.3	82.2	90
25	208	47.1	245	3.7	38.6	0.0	None	0.0	-	-	159.4	200
							E18	13.5	1	37.5	159.4	200
							E36	27.0	2	75.1	159.4	200
							E54	40.6	2	112.6	189.1	200
							E72	54.1	2	150.1	198.4	225
	230	47.1	245	3.7	38.6	0.0	None	0.0	-	-	159.4	200
							E18	18.0	1	43.3	159.4	200
							E36	36.0	2	86.6	159.4	200
							E54	54.0	2	129.9	178.2	200
							E72	72.0	2	173.2	221.5	250
	460	19.6	125	1.9	19.3	0.0	None	0.0	-	-	71.0	90
							E18	18.0	1	21.7	71.0	90
							E36	36.0	2	43.3	78.3	90
							E54	54.0	2	65.0	89.1	100
							E72	72.0	2	86.6	110.7	125
	575	15.8	100	1.5	15.4	0.0	None	0.0	-	-	57.0	70
							E18	18.0	1	17.3	57.0	70
							E36	36.0	2	34.6	62.6	70
							E54	54.0	2	52.0	71.2	80
							E72	72.0	2	69.3	88.5	100

NOTE 1: HACR Type per NEC.

VOLTAGE LIMITATIONS				ELECTRIC HEAT CORRECTION FACTORS		
	POWER SUPPLY	VOLTAGE		NOMINAL VOLTAGE	VOLTAGE	kW CAP. MULTIPLIER
		MIN.	MAX.			
VOLTAGE LIMITATIONS[1]	208/230-3-60	187	253	240	230	0.92
	460-3-60	414	506	480	460	0.92
	565-3-60	518	630	600	575	0.92

1. Utilization Range “A” in accordance with ARI Standard 110.

TABLE 10: DR ELECTRICAL DATA - LOW AIRFLOW DRIVE MOTOR W/O POWERED CONVENIENCE OUTLET

MODEL TONNAGE	VOLTAGE	COMPRESSORS		OD FAN MOTORS FLA EACH	ID BLOWER MOTOR FLA	CONV OUTLET AMPS	HEATER OPTION				MIN. CIRCUIT AMPACITY (AMPS)	MAX. FUSE/ BRKR[1] SIZE (AMPS)
		RLA EACH	LRA EACH				MODEL	KW	STAGES	AMPS		
25	208	47.1	245	3.7	20.0	0.0	None	0.0	-	-	140.8	175
							E18	13.5	1	37.5	140.8	175
							E36	27.0	2	75.1	140.8	175
							E54	40.6	2	112.6	165.9	175
							E72	54.1	2	150.1	175.2	200
	230	47.1	245	3.7	20.0	0.0	None	0.0	-	-	140.8	175
							E18	18.0	1	43.3	140.8	175
							E36	36.0	2	86.6	140.8	175
							E54	54.0	2	129.9	154.9	175
							E72	72.0	2	173.2	198.2	225
	460	19.6	125	1.9	10.0	0.0	None	0.0	-	-	61.7	80
							E18	18.0	1	21.7	61.7	80
							E36	36.0	2	43.3	66.6	80
							E54	54.0	2	65.0	77.5	90
							E72	72.0	2	86.6	99.1	110
	575	15.8	100	1.5	8.2	0.0	None	0.0	-	-	49.8	60
							E18	18.0	1	17.3	49.8	60
							E36	36.0	2	34.6	53.6	60
							E54	54.0	2	52.0	62.2	70
							E72	72.0	2	69.3	79.5	90

NOTE 1: HACR Type per NEC.

VOLTAGE LIMITATIONS				ELECTRIC HEAT CORRECTION FACTORS		
	POWER SUPPLY	VOLTAGE		NOMINAL VOLTAGE	VOLTAGE	kW CAP. MULTIPLIER
		MIN.	MAX.	208	208	1.00
VOLTAGE LIMITATIONS[1]	208/230-3-60	187	253	240	230	0.92
	460-3-60	414	506	480	460	0.92
	565-3-60	518	630	600	575	0.92

1. Utilization Range “A” in accordance with ARI Standard 110.

TABLE 11: DR ELECTRICAL DATA - STANDARD DRIVE MOTOR WITH POWERED CONVENIENCE OUTLET

MODEL TONNAGE	VOLTAGE	COMPRESSORS		OD FAN MOTORS FLA EACH	ID BLOWER MOTOR FLA	CONV OUTLET AMPS	HEATER OPTION				MIN. CIRCUIT AMPACITY (AMPS)	MAX. FUSE/ BRKR[1] SIZE (AMPS)
		RLA EACH	LRA EACH				MODEL	KW	STAGES	AMPS		
15	208	22.4	164	2.1	15.4	10.0	None	0.0	-	-	84.2	100
							E18	13.5	1	37.5	84.2	100
							E36	27.0	2	75.1	125.4	150
							E54	40.6	2	112.6	172.6	175
							E72	54.1	2	150.1	181.9	200
	230	22.4	164	2.1	15.4	10.0	None	0.0	-	-	83.2	100
							E18	18.0	1	43.3	84.6	100
							E36	36.0	2	86.6	138.8	150
							E54	54.0	2	129.9	160.4	175
							E72	72.0	2	173.2	203.7	225
	460	10.9	100	1.1	7.2	5.0	None	0.0	-	-	41.1	50
							E18	18.0	1	21.7	42.3	50
							E36	36.0	2	43.3	69.4	70
							E54	54.0	2	65.0	80.2	90
							E72	72.0	2	86.6	101.9	110
	575	8.3	78	0.9	5.9	4.0	None	0.0	-	-	32.2	40
							E18	18.0	1	17.3	34.0	40
							E36	36.0	2	34.6	55.7	60
							E54	54.0	2	52.0	64.3	70
							E72	72.0	2	69.3	81.7	90
20	208	33.6	225	3.7	20.0	10.0	None	0.0	-	-	120.4	150
							E18	13.5	1	37.5	120.4	150
							E36	27.0	2	75.1	131.2	125
							E54	40.6	2	112.6	178.4	200
							E72	54.1	2	150.1	187.7	200
	230	33.6	225	3.7	20.0	10.0	None	0.0	-	-	120.4	150
							E18	18.0	1	43.3	120.4	150
							E36	36.0	2	86.6	145.8	150
							E54	54.0	2	129.9	167.4	175
							E72	72.0	2	173.2	210.7	225
	460	17.3	114	1.9	10.0	5.0	None	0.0	-	-	61.5	70
							E18	18.0	1	21.7	61.5	70
							E36	36.0	2	43.3	72.9	80
							E54	54.0	2	65.0	83.7	90
							E72	72.0	2	86.6	105.4	110
	575	13.5	80	1.5	8.2	4.0	None	0.0	-	-	48.6	60
							E18	18.0	1	17.3	48.6	60
							E36	36.0	2	34.6	58.6	60
							E54	54.0	2	52.0	67.2	70
							E72	72.0	2	69.3	84.5	90
25	208	47.1	245	3.7	38.6	10.0	None	0.0	-	-	169.4	200
							E18	13.5	1	37.5	169.4	200
							E36	27.0	2	75.1	169.4	200
							E54	40.6	2	112.6	201.6	225
							E72	54.1	2	150.1	210.9	225
	230	47.1	245	3.7	38.6	10.0	None	0.0	-	-	169.4	200
							E18	18.0	1	43.3	169.4	200
							E36	36.0	2	86.6	169.4	200
							E54	54.0	2	129.9	190.7	225
							E72	72.0	2	173.2	234.0	250
	460	19.6	125	1.9	19.3	5.0	None	0.0	-	-	76.0	90
							E18	18.0	1	21.7	76.0	90
							E36	36.0	2	43.3	84.5	90
							E54	54.0	2	65.0	95.3	110
							E72	72.0	2	86.6	117.0	125
	575	15.8	100	1.5	15.4	4.0	None	0.0	-	-	61.0	70
							E18	18.0	1	17.3	61.0	70
							E36	36.0	2	34.6	67.6	70
							E54	54.0	2	52.0	76.2	90
							E72	72.0	2	69.3	93.5	100

NOTE 1: HACR Type per NEC.

VOLTAGE LIMITATIONS				ELECTRIC HEAT CORRECTION FACTORS		
	POWER SUPPLY	VOLTAGE		NOMINAL VOLTAGE	VOLTAGE	kW CAP. MULTIPLIER
		MIN.	MAX.	208	208	1.00
VOLTAGE LIMITATIONS[1]	208/230-3-60	187	253	240	230	0.92
	460-3-60	414	506	480	460	0.92
	565-3-60	518	630	600	575	0.92

1. Utilization Range “A” in accordance with ARI Standard 110.

TABLE 12: DR ELECTRICAL DATA - HIGH STATIC DRIVE MOTOR WITH POWERED CONVENIENCE OUTLET

MODEL TONNAGE	VOLTAGE	COMPRESSORS		OD FAN MOTORS FLA EACH	ID BLOWER MOTOR FLA	CONV OUTLET AMPS	HEATER OPTION				MIN. CIRCUIT AMPACITY (AMPS)	MAX. FUSE/ BRKR[1] SIZE (AMPS)
		RLA EACH	LRA EACH				MODEL	KW	STAGES	AMPS		
15	208	22.4	164	2.1	20	10.0	None	0.0	-	-	88.8	110
							E18	13.5	1	37.5	88.8	110
							E36	27.0	2	75.1	131.2	150
							E54	40.6	2	112.6	178.4	200
							E72	54.1	2	150.1	187.7	200
	230	22.4	164	2.1	20	10.0	None	0.0	-	-	88.8	110
							E18	18.0	1	43.3	91.6	110
							E36	36.0	2	86.6	145.8	150
							E54	54.0	2	129.9	167.4	175
							E72	72.0	2	173.2	210.7	225
	460	10.9	100	1.1	10	5.0	None	0.0	-	-	43.9	50
							E18	18.0	1	21.7	45.8	50
							E36	36.0	2	43.3	72.9	80
							E54	54.0	2	65.0	83.7	90
							E72	72.0	2	86.6	105.4	110
	575	8.3	78	0.9	8.2	4.0	None	0.0	-	-	34.5	40
							E18	18.0	1	17.3	36.9	40
							E36	36.0	2	34.6	58.6	60
							E54	54.0	2	52.0	67.2	70
							E72	72.0	2	69.3	84.5	90
20	208	33.6	225	3.7	28	10.0	None	0.0	-	-	127.0	150
							E18	13.5	1	37.5	127.0	150
							E36	27.0	2	75.1	139.4	150
							E54	40.6	2	112.6	186.6	200
							E72	54.1	2	150.1	195.9	200
	230	33.6	225	3.7	26.6	10.0	None	0.0	-	-	127.0	150
							E18	18.0	1	43.3	127.0	150
							E36	36.0	2	86.6	154.0	175
							E54	54.0	2	129.9	175.7	200
							E72	72.0	2	173.2	219.0	225
	460	17.3	114	1.9	13.3	5.0	None	0.0	-	-	64.8	80
							E18	18.0	1	21.7	64.8	80
							E36	36.0	2	43.3	77.0	80
							E54	54.0	2	65.0	87.8	90
							E72	72.0	2	86.6	109.5	110
	575	13.5	80	1.5	10.3	4.0	None	0.0	-	-	50.7	60
							E18	18.0	1	17.3	50.7	60
							E36	36.0	2	34.6	61.2	70
							E54	54.0	2	52.0	69.8	70
							E72	72.0	2	69.3	87.2	90
25	208	47.1	245	3.7	38.6	10.0	None	0.0	-	-	169.4	200
							E18	13.5	1	37.5	169.4	200
							E36	27.0	2	75.1	169.4	200
							E54	40.6	2	112.6	201.6	225
							E72	54.1	2	150.1	210.9	225
	230	47.1	245	3.7	38.6	10.0	None	0.0	-	-	169.4	200
							E18	18.0	1	43.3	169.4	200
							E36	36.0	2	86.6	169.4	200
							E54	54.0	2	129.9	190.7	225
							E72	72.0	2	173.2	234.0	250
	460	19.6	125	1.9	19.3	5.0	None	0.0	-	-	76.0	90
							E18	18.0	1	21.7	76.0	90
							E36	36.0	2	43.3	84.5	90
							E54	54.0	2	65.0	95.3	110
							E72	72.0	2	86.6	117.0	125
	575	15.8	100	1.5	15.4	4.0	None	0.0	-	-	61.0	70
							E18	18.0	1	17.3	61.0	70
							E36	36.0	2	34.6	67.6	70
							E54	54.0	2	52.0	76.2	90
							E72	72.0	2	69.3	93.5	100

NOTE 1: HACR Type per NEC.

	VOLTAGE LIMITATIONS			ELECTRIC HEAT CORRECTION FACTORS		
	POWER SUPPLY	VOLTAGE		NOMINAL VOLTAGE	VOLTAGE	kW CAP. MULTIPLIER
		MIN.	MAX.			
VOLTAGE LIMITATIONS[1]	208/230-3-60	187	253	208	208	1.00
				240	230	0.92
	460-3-60	414	506	480	460	0.92
	565-3-60	518	630	600	575	0.92

1. Utilization Range “A” in accordance with ARI Standard 110.

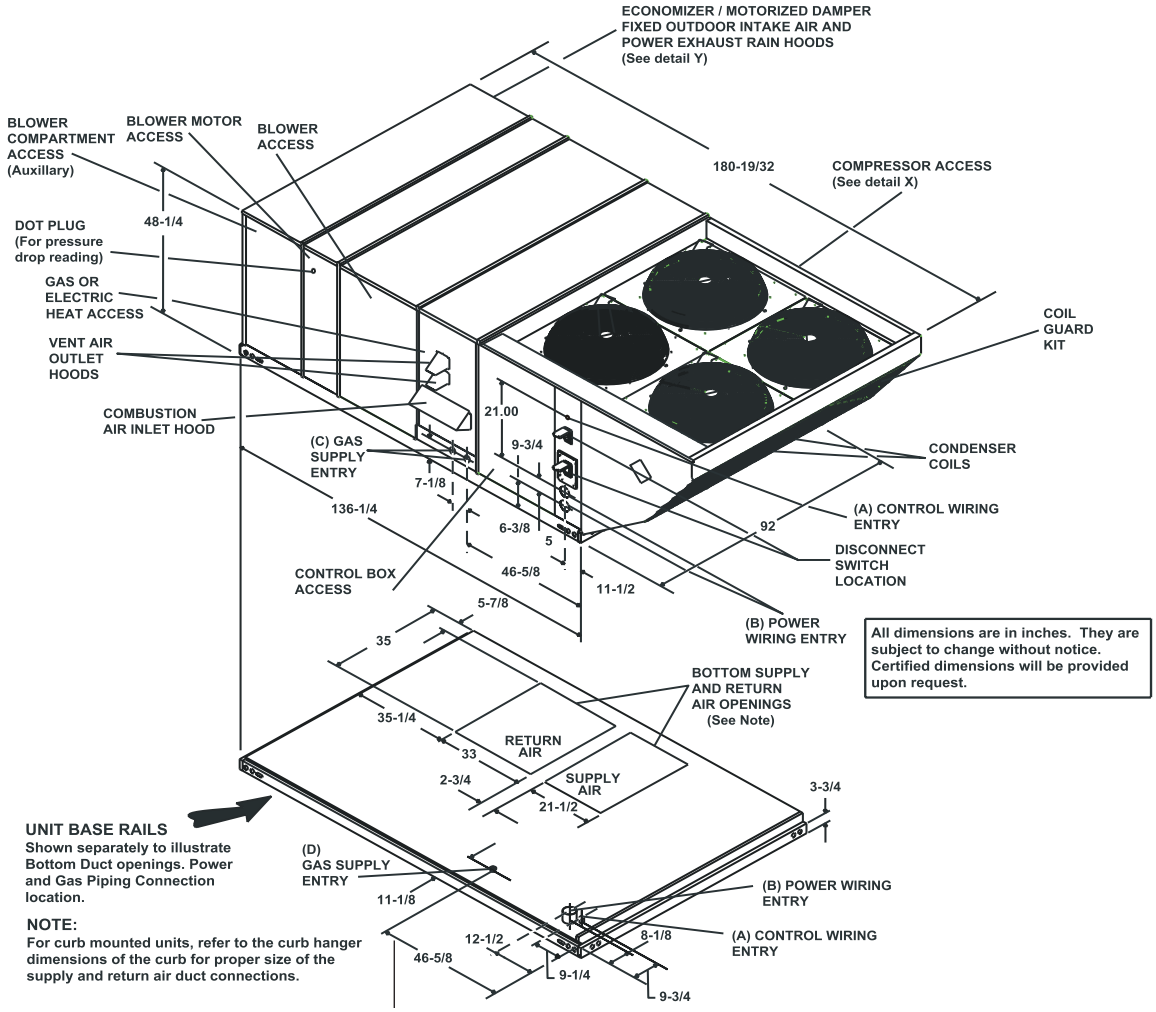
TABLE 13: DR ELECTRICAL DATA - LOW AIRFLOW DRIVE MOTOR WITH POWERED CONVENIENCE OUTLET

MODEL TONNAGE	VOLTAGE	COMPRESSORS		OD FAN MOTORS FLA EACH	ID BLOWER MOTOR FLA	CONV OUTLET AMPS	HEATER OPTION				MIN. CIRCUIT AMPACITY (AMPS)	MAX. FUSE/ BRKR[1] SIZE (AMPS)
		RLA EACH	LRA EACH				MODEL	KW	STAGES	AMPS		
25	208	47.1	245	3.7	20.0	10.0	None	0.0	-	-	150.8	175
							E18	13.5	1	37.5	150.8	175
							E36	27.0	2	75.1	150.8	175
							E54	40.6	2	112.6	178.4	200
							E72	54.1	2	150.1	187.7	200
	230	47.1	245	3.7	20.0	10.0	None	0.0	-	-	150.8	175
							E18	18.0	1	43.3	150.8	175
							E36	36.0	2	86.6	150.8	175
							E54	54.0	2	129.9	167.4	175
							E72	72.0	2	173.2	210.7	225
	460	19.6	125	1.9	10.0	5.0	None	0.0	-	-	66.7	80
							E18	18.0	1	21.7	66.7	80
							E36	36.0	2	43.3	72.9	80
							E54	54.0	2	65.0	83.7	90
							E72	72.0	2	86.6	105.4	110
	575	15.8	100	1.5	8.2	4.0	None	0.0	-	-	53.8	60
							E18	18.0	1	17.3	53.8	60
							E36	36.0	2	34.6	58.6	60
							E54	54.0	2	52.0	67.2	70
							E72	72.0	2	69.3	84.5	90

NOTE 1: HACR Type per NEC.

VOLTAGE LIMITATIONS				ELECTRIC HEAT CORRECTION FACTORS		
	POWER SUPPLY	VOLTAGE		NOMINAL VOLTAGE	VOLTAGE	kW CAP. MULTIPLIER
		MIN.	MAX.	208	208	1.00
VOLTAGE LIMITATIONS[1]	208/230-3-60	187	253	240	230	0.92
	460-3-60	414	506	480	460	0.92
	565-3-60	518	630	600	575	0.92

1. Utilization Range “A” in accordance with ARI Standard 110.



UTILITIES ENTRY DATA

HOLE	OPENING SIZE (DIA.)	USED FOR	
A	1-1/8" KO	Control Wiring	Front
	3/4" NPS (Fem.)		Bottom
B	3-5/8" KO	Power Wiring	Front
	3" NPS (Fem.)		Bottom
C	2-3/8" KO	Gas Piping (Front)	
D	1-11/16" Hole	Gas Piping (Bottom)*	

*Opening in the bottom of the unit can be located by the slice in the insulation.

CLEARANCES

Front	36"
Rear	24" (Less Economizer) 49" (With Economizer)
Left Side (Filter Access)	24" (Less Economizer) 36" (With Economizer)[3]
Right Side (Cond. Coil)	36"
Below Unit[1]	0"
Above Unit[2]	72" With 36" Maximum Horizontal Overhang (For Condenser Air Discharge Outlet)

[1]Units (applicable in U.S.A. only) may be installed on combustible floors made from wood or class A, B or C roof covering material.
[2]Units must be installed outdoors. Overhanging structures or shrubs should not obstruct condenser air discharge outlet.
[3]If economizer is factory installed, the unassembled rainhood must be removed from its ride-along position in front of evaporator coil, prior to final installation. The hood kit box is 54" long.

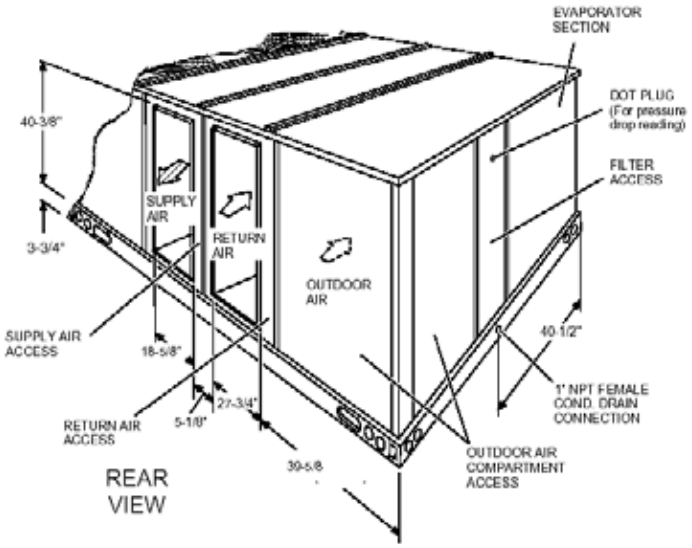
NOTE:
A 1" clearance must be provided between any combustible material and the supply air ductwork for a distance of 3 feet from the unit.

The products of combustion must not be allowed to accumulate within a confined space and recirculate.

Locate unit so that the vent air outlet hoods are at least:
Three (3) feet above any forced air inlet located within 10 horizontal feet (excluding those integral to the unit).

Four (4) feet below, 4 horizontal feet from, or 1 foot above any door or gravity air inlet into the building.

FIGURE 12 - DIMENSIONS & CLEARANCES 15/20/25 TON



DUCT COVERS - Units are shipped with the bottom duct openings covered. An accessory flange kit is available for connecting side ducts.

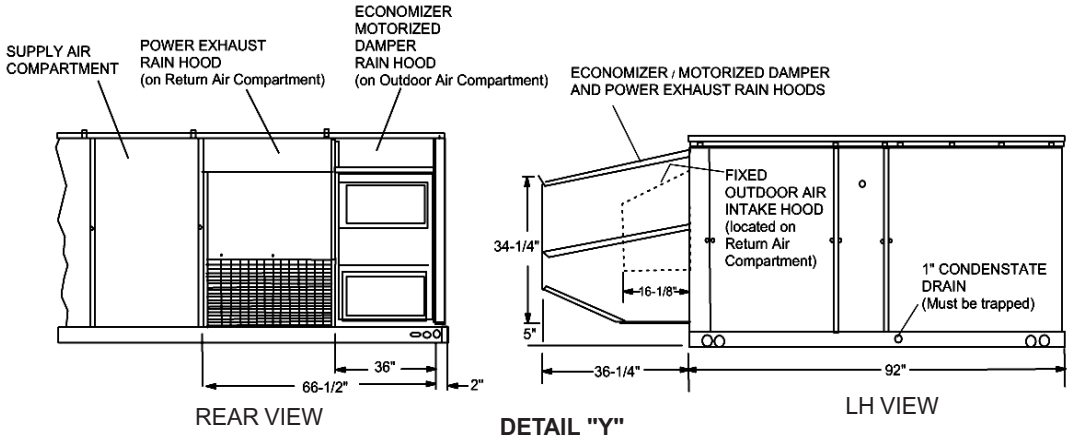
For bottom duct applications:

1. Remove the side panels from the supply and return air compartments to gain access to the bottom supply and return air duct covers.
2. Remove and discard the bottom duct covers (Duct openings are closed with sheet metal covers except when the unit includes a power exhaust option. The covering consists of a heavy black paper composition.)
3. Replace the side supply and return air compartment panels.

For side duct application:

1. Replace the side panels on the supply and return air compartments with the accessory flange kit panels.
2. Connect ductwork to the duct flanges on the rear of the unit.

DETAIL "X"
ACCESSORY SIDE SUPPLY AND RETURN AIR OPENINGS



DETAIL "Y"
UNIT WITH RAIN HOODS

FIGURE 12 - DIMENSIONS & CLEARANCES 15/20/25 TON (CONTINUED)

CFM, STATIC PRESSURE, AND POWER - ALTITUDE AND TEMPERATURE CORRECTIONS

The information below should be used to assist in application of product when being applied at altitudes at or exceeding 1000 feet above sea level.

The air flow rates listed in the standard blower performance tables are based on standard air at sea level. As the altitude or temperature increases, the density of air decreases. In order to use the indoor blower tables for high altitude applications, certain corrections are necessary.

A centrifugal fan is a "constant volume" device. This means that, if the rpm remains constant, the CFM delivered is the same regardless of the density of the air. However, since the air at high altitude is less dense, less static pressure will be generated and less power will be required than a similar application at sea level. Air density correction factors are shown in Table 14 and Figure 13.

TABLE 14: ALTITUDE CORRECTION FACTORS

AIR TEMP	ALTITUDE (FEET)										
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
40	1.060	1.022	0.986	0.950	0.916	0.882	0.849	0.818	0.788	0.758	0.729
50	1.039	1.002	0.966	0.931	0.898	0.864	0.832	0.802	0.772	0.743	0.715
60	1.019	0.982	0.948	0.913	0.880	0.848	0.816	0.787	0.757	0.729	0.701
70	1.000	0.964	0.930	0.896	0.864	0.832	0.801	0.772	0.743	0.715	0.688
80	0.982	0.947	0.913	0.880	0.848	0.817	0.787	0.758	0.730	0.702	0.676
90	0.964	0.929	0.897	0.864	0.833	0.802	0.772	0.744	0.716	0.689	0.663
100	0.946	0.912	0.880	0.848	0.817	0.787	0.758	0.730	0.703	0.676	0.651

The examples below will assist in determining the airflow performance of the product at altitude.

Example 1: What are the corrected CFM, static pressure, and BHP at an elevation of 5,000 ft. if the blower performance data is 6,000 CFM, 1.5 IWC and 4.0 BHP?

Solution: At an elevation of 5,000 ft the indoor blower will still deliver 6,000 CFM if the rpm is unchanged. However, Table 14 must be used to determine the static pressure and BHP. Since no temperature data is given, we will assume an air temperature of 70°F. Table 14 shows the correction factor to be 0.832.

Corrected static pressure = 1.5 x 0.832 = 1.248 IWC

Corrected BHP = 4.0 x 0.832 = 3.328

Example 2: A system, located at 5,000 feet of elevation, is to deliver 6,000 CFM at a static pressure of 1.5". Use the unit blower tables to select the blower speed and the BHP requirement.

Solution: As in the example above, no temperature information is given so 70°F is assumed.

The 1.5" static pressure given is at an elevation of 5,000 ft. The first step is to convert this static pressure to equivalent sea level conditions.

Sea level static pressure = 1.5 / .832 = 1.80"

Enter the blower table at 6000 sCFM and static pressure of 1.8". The rpm listed will be the same rpm needed at 5,000 ft.

Suppose that the corresponding BHP listed in the table is 3.2. This value must be corrected for elevation.

BHP at 5,000 ft = 3.2 x .832 = 2.66

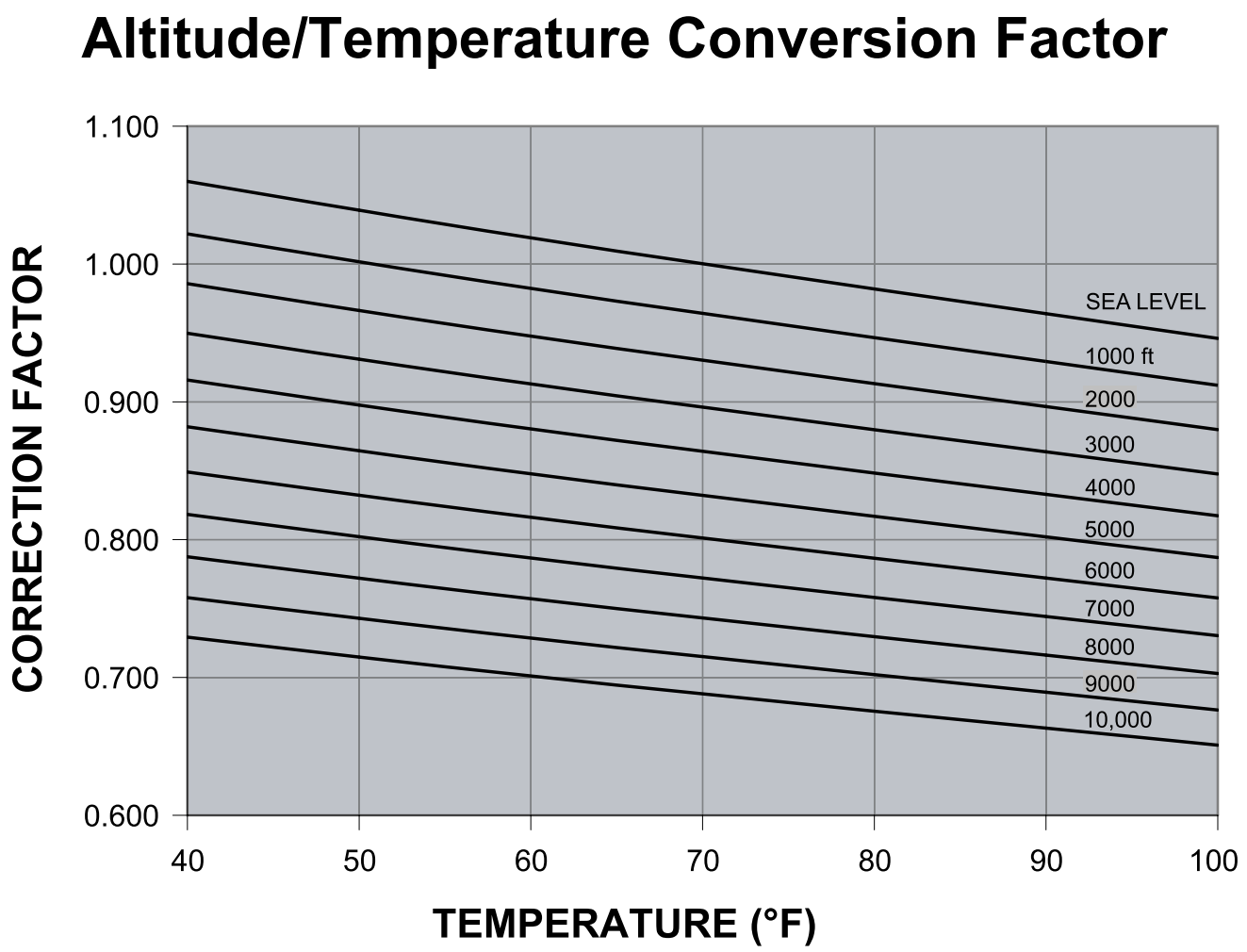


FIGURE 13 - ALTITUDE/TEMPERATURE CONVERSION FACTOR

TABLE 15: DR180 BLOWER PERFORMANCE - STANDARD DRIVE (COOLING ONLY)

15 ton Standard Drive Blower Performance (Horizontal Discharge)																								
ESP	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**
0.2	6373	931	3.343	4.01	6172	899	3.058	3.67	5821	868	2.664	3.20	5591	834	2.415	2.90	5332	801	2.154	2.59	5081	769	1.859	2.23
0.4	6013	932	3.099	3.72	5783	900	2.834	3.40	5409	869	2.412	2.89	5158	836	2.207	2.65	4854	802	1.932	2.32	4597	770	1.661	1.99
0.6	5610	935	2.840	3.41	5364	902	2.537	3.04	5016	870	2.167	2.60	4704	837	1.978	2.37	4374	804	1.734	2.08	4081	772	1.464	1.76
0.8	5205	937	2.600	3.12	4912	904	2.345	2.81	4534	873	1.956	2.35	4208	838	1.740	2.09	3896	805	1.542	1.85	3437	773	1.235	1.48
1.0	4767	938	2.371	2.85	4436	905	2.172	2.61	4009	874	1.749	2.10	3598	840	1.533	1.84	3175	807	1.26	1.51	2665	774	0.987	1.18
1.2	4268	940	2.130	2.56																				
	1 turn				**2 turns**				**3 turns**				**4 turns**				**5 turns**				**6 turns**			

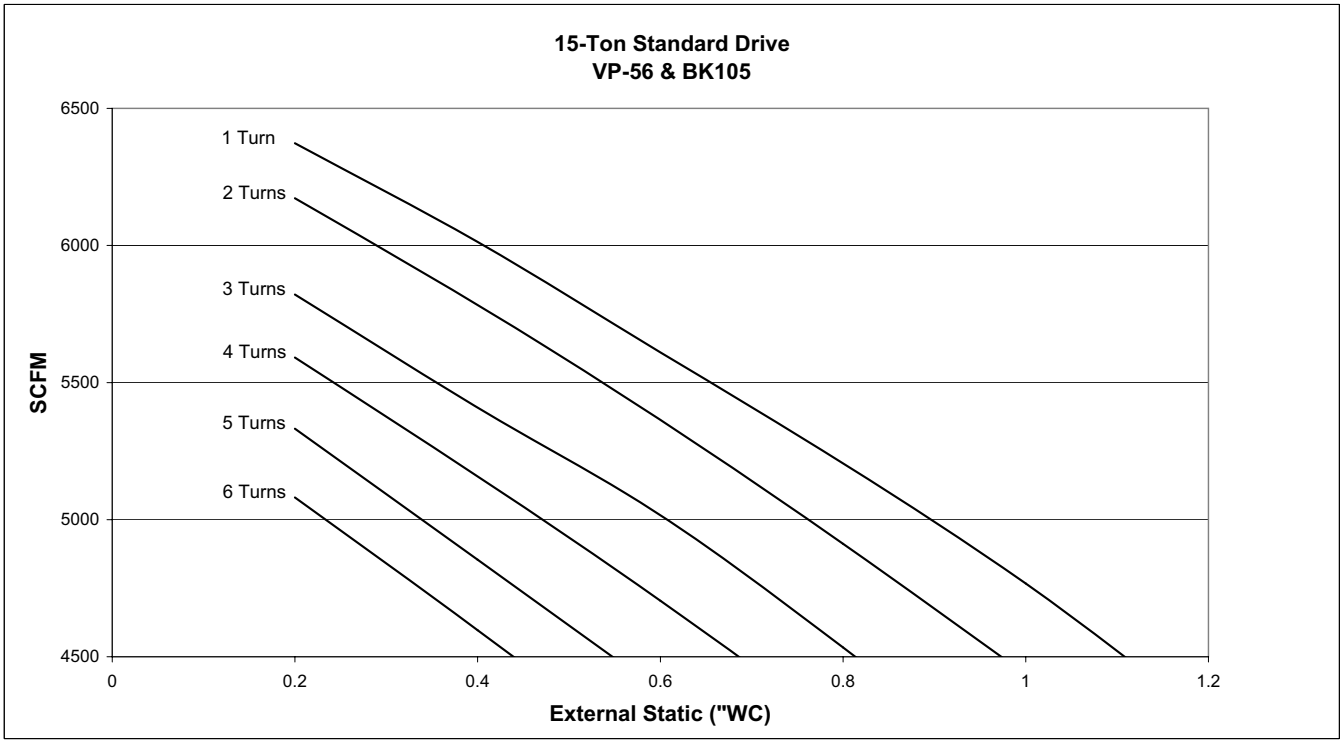


TABLE 16: DR180 BLOWER PERFORMANCE - STANDARD DRIVE (GAS HEAT)

15 ton Standard Drive Blower Performance (Horizontal Discharge)																								
ESP	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**	**CFM**	**RPM**	**KW**	**BHP**
0.2	6246	912	3.276	3.93	6049	881	2.997	3.60	5705	851	2.611	3.13	5479	818	2.367	2.84	5225	785	2.111	2.53	4979	754	1.822	2.19
0.4	5893	914	3.037	3.65	5667	882	2.777	3.33	5301	852	2.364	2.84	5055	819	2.163	2.60	4757	786	1.893	2.27	4505	755	1.628	1.95
0.6	5498	916	2.783	3.34	5257	883	2.486	2.98	4916	853	2.124	2.55	4610	820	1.938	2.33	4287	788	1.699	2.04	3999	757	1.435	1.72
0.8	5101	918	2.548	3.06	4814	885	2.298	2.76	4443	856	1.917	2.30	4124	821	1.705	2.05	3818	789	1.511	1.81	3368	758	1.210	1.45
1.0	4672	919	2.324	2.79	4347	887	2.129	2.55	3929	857	1.714	2.06	3526	823	1.502	1.80	3112	791	1.235	1.48	2612	759	0.967	1.16
1.2	4183	921	2.087	2.51																				
	1 turn				**2 turns**				**3 turns**				**4 turns**				**5 turns**				**6 turns**			

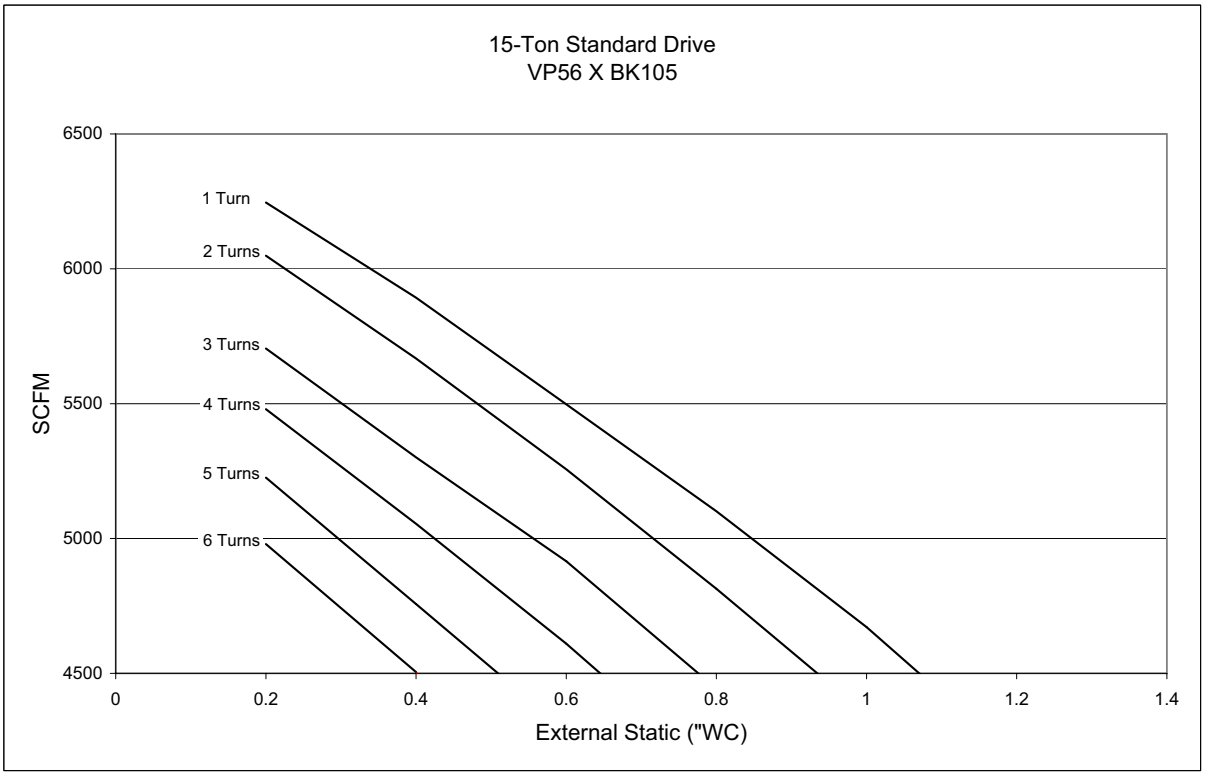


TABLE 17: DR180 BLOWER PERFORMANCE - HIGH STATIC DRIVE (COOLING ONLY)

15 Ton High Static Drive Blower Performance (Horizontal Discharge)

ESP	0 turns				1 turn				2 turns				3 turns				4 turns				5 turns				6 turns			
	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP
0.2	8032	1168	6.346	7.80	7765	1129	5.808	7.14	7396	1092	5.143	6.32	7225	1053	4.552	5.60	6936	1013	4.209	5.18	6573	972	3.730	4.48	6271	933	3.307	3.97
0.4	7747	1166	6.122	7.53	7479	1125	5.525	6.79	7095	1091	4.860	5.98	6907	1054	4.347	5.35	6610	1013	3.936	4.72	6270	973	3.438	4.13	5923	934	3.046	3.66
0.6	7490	1170	5.841	7.18	7161	1131	5.268	6.48	6792	1093	4.602	5.66	6578	1054	4.074	5.01	6243	1013	3.657	4.39	5955	974	3.197	3.84	5512	933	2.869	3.44
0.8	7209	1170	5.551	6.83	6841	1132	4.967	6.11	6508	1094	4.347	5.35	6292	1055	3.969	4.76	5875	1014	3.418	4.10	5575	974	3.005	3.61	5153	935	2.550	3.06
1.0	6905	1171	5.247	6.45	6531	1133	4.642	5.71	6223	1095	4.118	5.06	5952	1055	3.658	4.39	5535	1015	3.102	3.72	5144	975	2.686	3.22	4689	936	2.392	2.87
1.2	6583	1172	4.948	6.08	6203	1134	4.397	5.41	5866	1097	3.803	4.56	5585	1057	3.388	4.07	5091	1017	2.899	3.48	4686	976	2.471	2.97				
1.4	6252	1175	4.658	5.73	5836	1136	4.057	4.87	5502	1098	3.596	4.32	5166	1058	3.095	3.71	4617	1017	2.598	3.12								
1.6	5823	1177	4.324	5.32	5457	1138	3.790	4.55	5075	1099	3.285	3.94	4670	1059	2.801	3.36												
1.8	5427	1179	4.066	4.88	5032	1139	3.483	4.18	4585	1100	2.891	3.47																
2.0	4986	1180	3.632	4.36	4520	1141	3.241	3.89																				

Chart shading corresponds to minimum motor horsepower requirements as defined below.
7.5 HP motor 5 HP motor

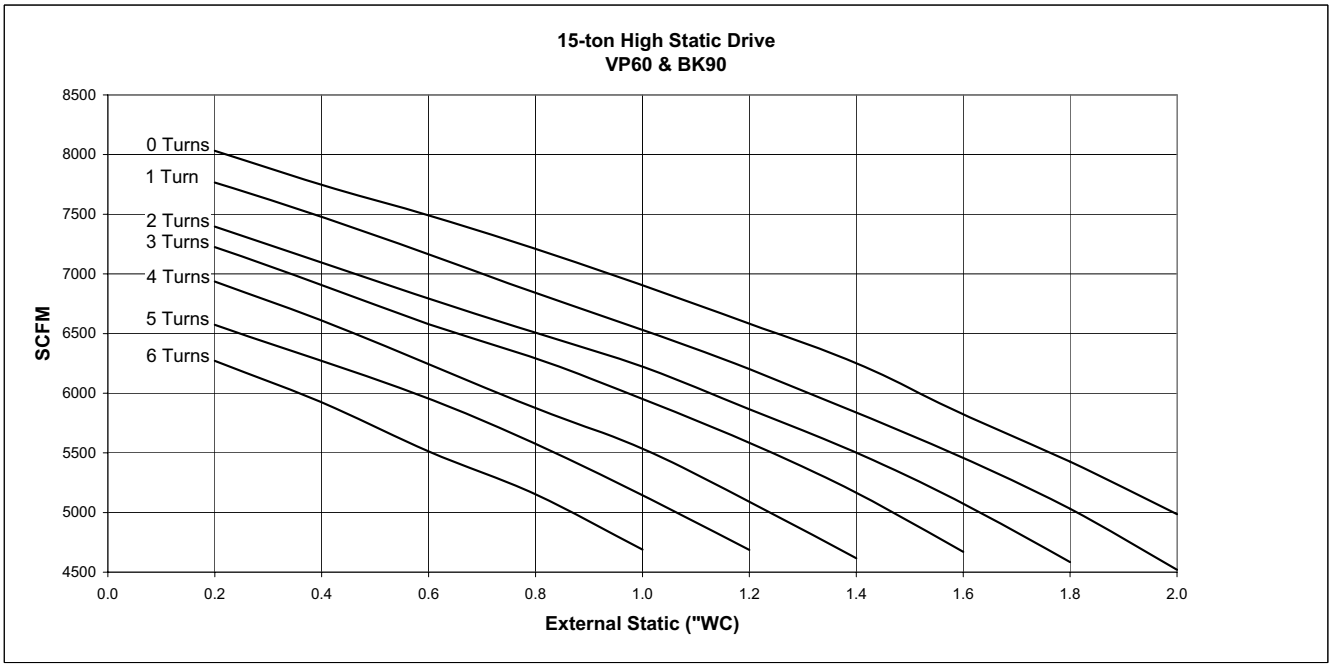


TABLE 18: DR180 BLOWER PERFORMANCE - HIGH STATIC DRIVE (GAS HEAT)

15 Ton High Static Drive Blower Performance (Horizontal Discharge)

ESP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP
0.2	7871	1145	6.22	7.65	7610	1106	5.69	7.00	7248	1070	5.04	6.20	7081	1032	4.46	5.49	6797	993	4.12	5.07	6442	953	3.66	4.39	6146	914	3.24	3.89
0.4	7592	1143	6.00	7.38	7329	1103	5.41	6.66	6953	1069	4.76	5.86	6769	1033	4.26	5.24	6478	993	3.86	4.63	6095	954	3.37	4.04	5805	915	2.99	3.58
0.6	7340	1147	5.72	7.04	7018	1108	5.16	6.35	6656	1071	4.51	5.55	6446	1033	3.99	4.79	6118	993	3.58	4.30	5795	955	3.13	3.76	5402	914	2.81	3.37
0.8	7065	1147	5.44	6.69	6704	1109	4.87	5.99	6398	1072	4.26	5.24	6175	1034	3.89	4.67	5758	994	3.35	4.02	5464	955	2.94	3.53	5050	916	2.50	3.00
1.0	6767	1148	5.14	6.32	6400	1110	4.55	5.59	6099	1073	4.04	4.84	5833	1034	3.58	4.30	5424	995	3.04	3.65	5041	956	2.63	3.16	4595	917	2.34	2.81
1.2	6451	1149	4.85	5.96	6079	1111	4.31	5.30	5749	1075	3.73	4.47	5473	1036	3.32	3.99	4989	997	2.84	3.41	4592	956	2.42	2.91				
1.4	6127	1152	4.56	5.61	5719	1113	3.98	4.77	5392	1076	3.52	4.23	5063	1037	3.03	3.64	4525	997	2.55	3.06								
1.6	5707	1153	4.24	5.21	5348	1115	3.71	4.46	4974	1077	3.22	3.86	4577	1038	2.74	3.29												
1.8	5318	1155	3.98	4.78	4931	1116	3.41	4.10	4493	1078	2.83	3.40																
2.0	4886	1156	3.56	4.27	4430	1118	3.18	3.81																				
	0 turns				1 turn				2 turns				3 turns				4 turns				5 turns				6 turns			

Chart shading corresponds to minimum motor horsepower requirements as defined below.
7.5 HP motor 5 HP motor

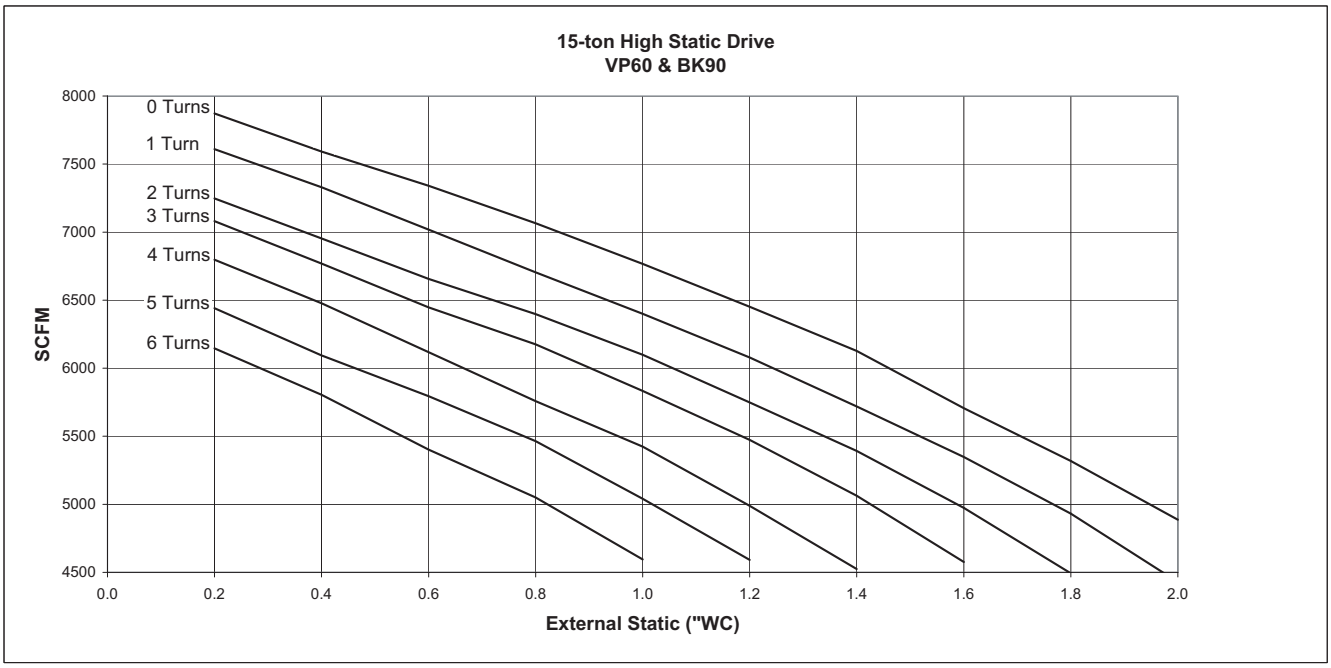


TABLE 19: DR240 BLOWER PERFORMANCE - STANDARD DRIVE (COOLING ONLY)

DR240 Standard Drive Blower Performance (Horizontal Discharge)

ESP	1 Turn				2 Turns				3 Turns				4 Turns				5 Turns				6 Turns			
	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP
0.2	9445	1025	6.94	8.79	9021	993	6.211	7.87	8684	962	5.59	7.08	8422	929	5.057	6.41	8028	896	4.516	5.72	7677.5	863	4.00758	5.08
0.4	9172	1027	6.629	8.40	8645	995	5.912	7.49	8282	963	5.3	6.72	8022	930	4.781	6.06	7605	897	4.259	5.40	7243	864	3.75462	4.76
0.6	8689	1028	6.283	7.96	8262	996	5.606	7.10	7869	965	5	6.34	7585	931	4.482	5.68	7160	898	3.971	5.03	7182.8	864	3.47616	4.41
0.8	8363	1028	5.979	7.58	7859	997	5.284	6.70	7434	965	4.67	5.92	7136	932	4.171	5.29	6684	899	3.671	4.65	6421.9	865	3.24768	4.12
1	7944	1029	5.612	7.11	7410	998	4.924	6.24	6950	966	4.3	5.45	6643	933	3.836	4.86	6142	900	3.328	4.22	5834.4	866	2.92638	3.71
1.2	7498	1030	5.238	6.64	6936	1000	4.556	5.77	6443	967	3.95	5.01	6104	934	3.496	4.43	5595	901	1.224	1.55	5217.3	867	2.59998	3.29
1.4	6997	1033	4.835	6.13	6429	1001	4.179	5.30	5921	969	3.58	4.54	5406	936	3.098	3.93	4942	902	2.672	3.39	4488	868	2.26746	2.87
1.6	6421	1034	4.443	5.63	5916	1002	3.79	4.80	5296	970	3.21	4.07	4691	938	2.699	3.42	4318	903	2.391	3.03				
1.8	5814	1036	4.024	5.10	5277	1004	3.402	4.31	4608	971	2.84	3.60												
2	5234	1038	3.605	4.57	4676	1005	3.066	3.89																

Chart shading corresponds to minimum motor horsepower requirements as defined below.

7.5 HP motor

5 HP motor

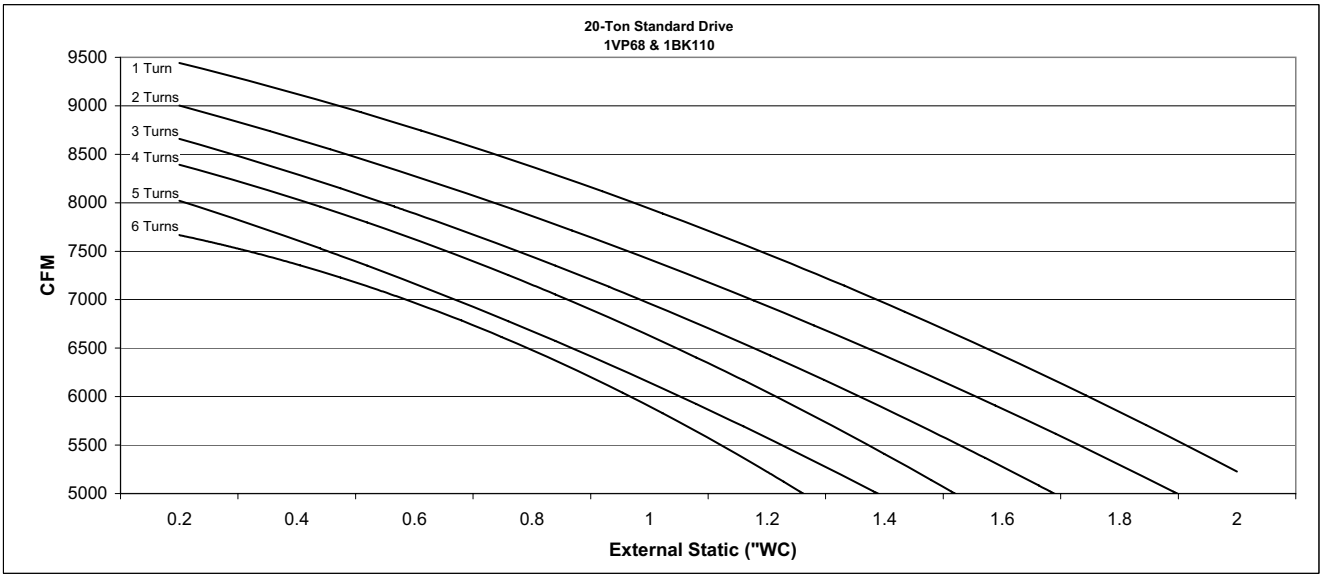


TABLE 20: DR240 BLOWER PERFORMANCE - STANDARD DRIVE (GAS HEAT)

DR240 Standard Drive Blower Performance (Gas heat) (Horizontal Discharge)

ESP	1 Turn				2 Turns				3 Turns				4 Turns				5 Turns				6 Turns			
	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP
0.2	9260	1005	6.804	8.62	8844	974	6.089	7.72	8514	943	5.48	6.94	8257	911	4.958	6.28	7871	878	4.427	5.61	7527	846	3.929	4.98
0.4	8992	1007	6.499	8.24	8475	975	5.796	7.35	8120	944	5.199	6.59	7865	912	4.687	5.94	7456	879	4.175	5.29	7101	847	3.681	4.66
0.6	8519	1008	6.16	7.81	8100	976	5.496	6.96	7715	946	4.903	6.21	7436	913	4.394	5.57	7020	880	3.893	4.93	7042	847	3.408	4.32
0.8	8199	1008	5.862	7.43	7705	977	5.18	6.56	7288	946	4.581	5.81	6996	914	4.089	5.18	6553	881	3.599	4.56	6296	848	3.184	4.03
1	7788	1009	5.502	6.97	7265	978	4.827	6.12	6814	947	4.22	5.35	6513	915	3.761	4.77	6022	882	3.263	4.14	5720	849	2.869	3.64
1.2	7351	1010	5.135	6.51	6800	980	4.467	5.66	6317	948	3.876	4.91	5984	916	3.427	4.34	5485	883	1.2	1.52	5115	850	2.549	3.23
1.4	6860	1013	4.74	6.01	6303	981	4.097	5.19	5805	950	3.513	4.45	5300	918	3.037	3.85	4845	884	2.62	3.32	4400	851	2.223	2.82
1.6	6295	1014	4.356	5.52	5800	982	3.716	4.71	5192	951	3.15	3.99	4599	920	2.646	3.35	4233	885	2.344	2.97				
1.8	5700	1016	3.945	5.00	5174	984	3.335	4.23	4518	952	2.784	3.53												
2	5131	1018	3.534	4.48	4584	985	3.006	3.81																

Chart shading corresponds to minimum motor horsepower requirements as defined below.

7.5 HP motor 5 HP motor

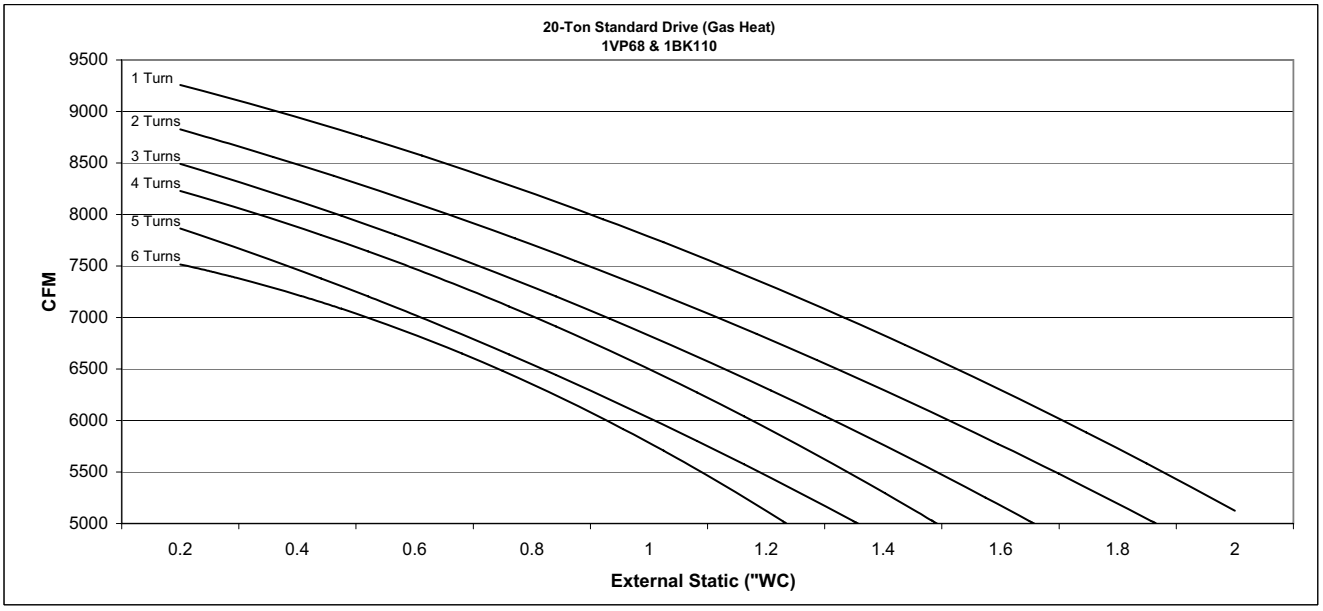


TABLE 21: DR240 BLOWER PERFORMANCE - HIGH STATIC DRIVE (COOLING ONLY)

DR240 Blower Performance (Horizontal Discharge) (High Static Option)

ESP	1 Turn				2 Turns				3 Turns				4 Turns				5 Turns				6 Turns			
	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP
0.2	10477	1118	9.15	11.64	10161	1086	8.42	10.70	9949	1056	7.76	9.86	9634	1025	7.05	8.96	9232	973	6.43	8.18	8880	956	5.74	7.30
0.4	10144	1119	8.82	11.21	9792	1088	8.06	10.24	9589	1057	7.41	9.42	9231	1025	6.75	8.58	8849	974	6.13	7.79	8473	951	5.45	6.92
0.6	9826	1121	8.58	10.91	9427	1089	7.70	9.79	9209	1058	7.08	9.00	8852	1026	6.43	8.18	8570	993	5.90	7.50	8101	955	5.18	6.58
0.8	9473	1122	8.14	10.35	9059	1090	7.35	9.34	8813	1059	6.73	8.55	8467	1027	6.11	7.76	8145	993	5.55	7.06	7609	962	4.80	6.10
1	9032	1123	7.77	9.88	8669	1091	6.97	8.87	8395	1060	6.34	8.06	8051	1028	5.75	7.31	7693	995	5.19	6.60	7112	961	4.44	5.64
1.2	8654	1124	7.37	9.37	8397	1094	6.67	8.48	7952	1061	5.95	7.56	7611	1029	5.38	6.84	7210	996	4.82	6.13	6616	962	4.10	5.21
1.4	8262	1126	6.97	8.86	7948	1094	6.24	7.94	7481	1063	5.54	7.04	7132	1029	4.99	6.35	6692	997	4.45	5.66	6122	965	3.77	4.80
1.6	7815	1127	6.54	8.32	7481	1095	5.84	7.42	7024	1063	5.16	6.56	6615	1031	4.60	5.85	5870	997	4.06	5.16	5478	967	3.37	4.28
1.8	7372	1128	6.13	7.79	6927	1097	5.43	6.90	6550	1064	4.84	6.15	6036	1032	4.20	5.34	5518	998	3.67	4.67	4811	966	3.01	3.83
2	6909	1130	5.71	7.26	6324	1098	5.10	6.48	5925	1066	4.39	5.59	5458	1033	3.79	4.82	4852	1000	3.30	4.20				
2.2	6324	1131	5.30	6.74	5763	1099	4.39	5.58	5560	1066	4.14	5.26	4909	1034	3.47	4.42								
2.4	5814	1133	4.69	5.96	5247	1100	4.14	5.27	5195	1067	3.89	4.94												
2.6	5302	1134	4.45	5.66																				

Chart shading corresponds to minimum horsepower requirements as defined below.

10 HP motor 7.5 HP motor 5 HP motor

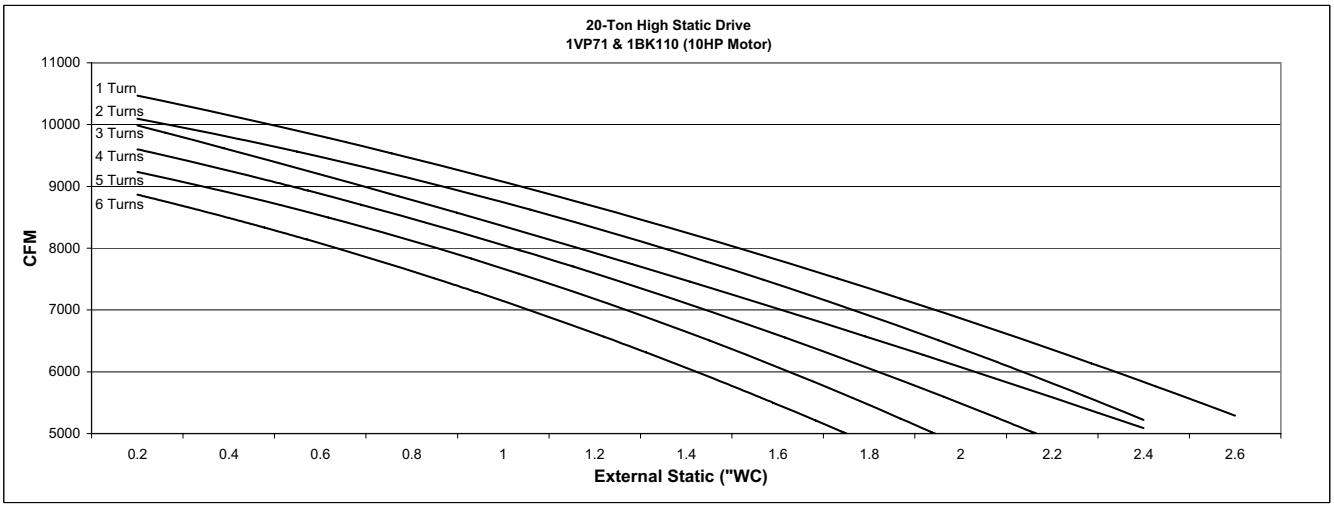


TABLE 22: DR240 BLOWER PERFORMANCE - HIGH STATIC DRIVE (GAS HEAT)

DR240 Blower Performance (Gas Heat) (Horizontal Discharge) (High Static Option)

ESP	1 Turn				2 Turns				3 Turns				4 Turns				5 Turns				6 Turns			
	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP
0.2	10272	1096	8.98	11.4	9962	1065	8.25	10.5	9754	1035	7.61	9.67	9445	1005	6.91	8.79	9051	954	6.31	8.02	8706	937	5.63	7.16
0.4	9945	1097	8.65	11	9600	1067	7.9	10	9401	1036	7.27	9.24	9050	1005	6.62	8.41	8675	955	6.01	7.64	8307	932	5.34	6.79
0.6	9633	1099	8.41	10.7	9242	1068	7.55	9.6	9028	1037	6.94	8.82	8678	1006	6.31	8.02	8402	974	5.78	7.35	7942	936	5.07	6.45
0.8	9287	1100	7.98	10.1	8881	1069	7.21	9.16	8640	1038	6.59	8.38	8301	1007	5.99	7.61	7985	974	5.45	6.92	7460	943	4.71	5.98
1	8855	1101	7.62	9.68	8499	1070	6.84	8.69	8230	1039	6.22	7.9	7893	1008	5.64	7.16	7542	975	5.09	6.47	6973	942	4.35	5.53
1.2	8484	1102	7.23	9.19	8232	1073	6.54	8.31	7796	1040	5.83	7.41	7462	1009	5.27	6.7	7069	976	4.73	6.01	6486	943	4.02	5.11
1.4	8100	1104	6.84	8.69	7792	1073	6.12	7.78	7334	1042	5.43	6.9	6992	1009	4.9	6.23	6561	977	4.36	5.55	6002	946	3.7	4.7
1.6	7662	1105	6.41	8.15	7334	1074	5.73	7.28	6886	1042	5.06	6.44	6485	1011	4.51	5.74	5755	977	3.98	5.06	5371	948	3.3	4.2
1.8	7227	1106	6.01	7.63	6791	1075	5.32	6.77	6422	1043	4.74	6.03	5918	1012	4.12	5.24	5410	978	3.6	4.57	4717	947	2.95	3.76
2	6774	1108	5.6	7.12	6200	1076	5	6.36	5809	1045	4.31	5.48	5351	1013	3.72	4.73	4757	980	3.24	4.11				
2.2	6200	1109	5.2	6.61	5650	1077	4.3	5.47	5451	1045	4.06	5.16	4813	1014	3.41	4.33								
2.4	5700	1111	4.6	5.85	5144	1078	4.06	5.17	5093	1046	3.81	4.85												
2.6	5198	1112	4.37	5.55																				

Chart shading corresponds to minimum horsepower requirements as defined below.

10 HP motor 7.5 HP motor 5 HP motor

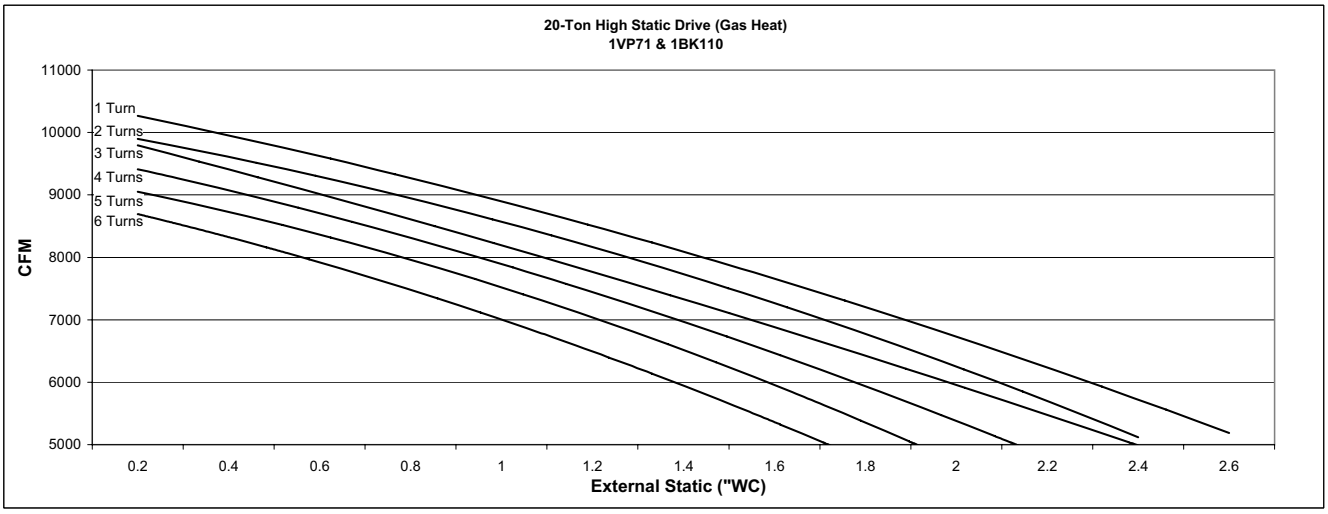


TABLE 23: DR300 BLOWER PERFORMANCE - STANDARD DRIVE

DR300 Blower Performace (Horizontal Discharge)																								
ESP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP
0.4	9550	996	7.1	9.04	8800	959	6.1	7.79	8700	950	5.9	7.53	8250	913	4.95	6.97	8050	877	4.7	5.99	7250	842	3.9	4.97
0.6	9010	997	6.6	8.43	8150	960	5.6	7.15	8010	950	5.4	6.89	7540	915	4.57	6.44	7290	879	4.2	5.33	6460	843	3.5	4.47
0.8	8430	998	6.1	7.79	7510	961	5.1	6.51	7330	952	4.9	6.25	6820	916	4.09	5.77	6480	880	3.7	4.76	5600	844	3.1	3.99
1	7830	1000	5.6	7.15	6830	962	4.6	5.87	6570	953	4.4	5.62	5990	916	3.52	4.96	5500	881	3.1	3.99				
1.2	7210	1000	5.1	6.51	6140	964	4.2	5.36	5850	954	3.8	4.86	5210	918	3.05	4.29								
1.4	6500	1001	4.6	5.87	5480	965	3.6	4.6																
1.6	5460	1003	3.9	4.97																				
	1 Turn				2 Turns				3 Turns				4 Turns				5 Turns				6 Turns			

Chart shading corresponds to minimum motor horsepower requirements as defined below.

10 HP motor 7.5 HP motor 5 HP motor

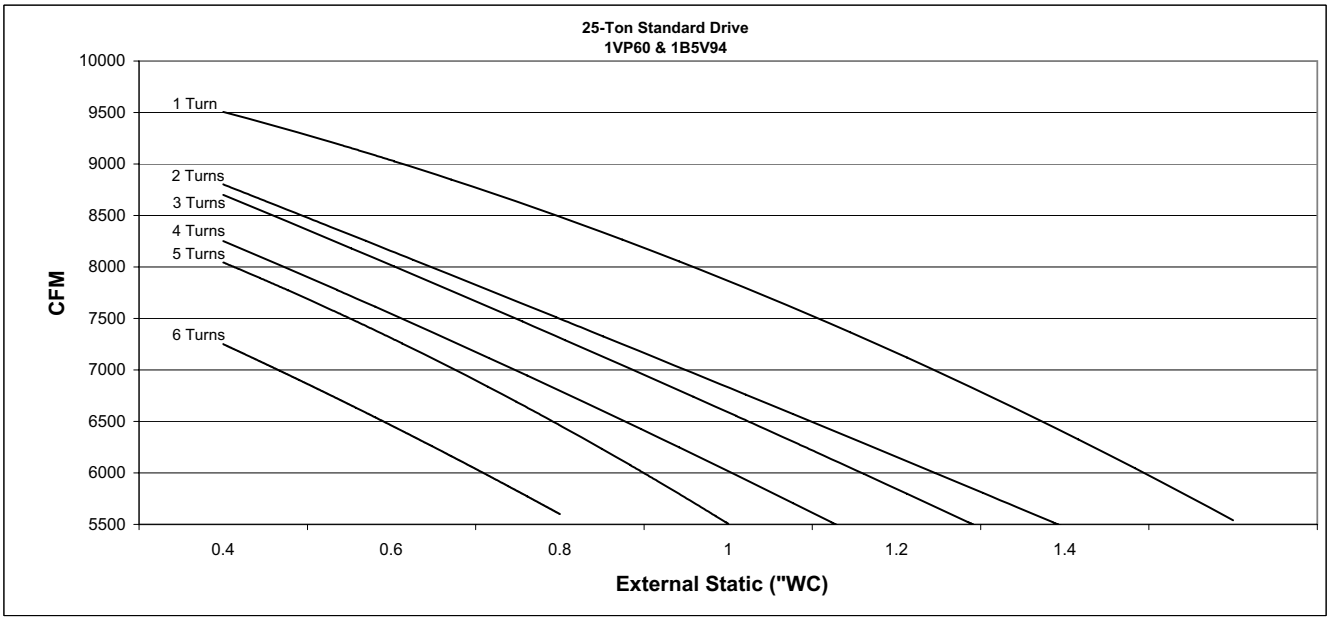


TABLE 24: DR300 BLOWER PERFORMANCE - HIGH STATIC DRIVE

DR300 Blower Performance (Horizontal Discharge)																								
ESP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP	CFM	RPM	KW	BHP
0.4	11600	1200	12.5	16.0	11175	1164	11.5	14.7	10620	1127	10.4	13.3	10500	1092	9.2	11.7	9875	1058	8.2	10.5	9100	1020	7.4	9.4
0.6	11060	1201	11.8	15.1	10600	1166	10.8	13.8	10100	1131	9.7	12.4	9980	1095	8.6	11.0	9320	1060	7.6	9.7	8920	1022	6.9	8.8
0.8	10500	1203	11.1	14.2	10100	1169	10.2	13.0	9520	1132	9.1	11.6	9360	1097	8	10.2	8600	1061	6.9	8.8	8230	1024	6.3	8.0
1	9930	1205	10.4	13.3	9430	1171	9.5	12.1	8870	1134	8.4	10.7	8800	1099	7.4	9.4	8240	1063	6.4	8.2	7500	1025	5.7	7.3
1.2	9800	1207	9.9	12.6	9270	1173	8.9	11.4	8590	1136	7.9	10.1	8120	1101	6.8	8.7	7240	1065	5.7	7.3	6990	1027	5.2	6.6
1.4	9200	1210	9.2	11.7	8480	1174	7.9	10.1	8070	1039	7.1	9.1	7340	1103	6.1	7.8	6820	1066	5.3	6.8	6100	1029	4.8	6.1
1.6	8400	1213	8.4	10.7	7750	1177	7.2	9.2	7560	1140	6.5	8.3	7220	1103	5.9	7.5	5380	1069	4.2	5.4				
1.8	7830	1215	7.7	9.8	7600	1178	7	8.9	6600	1142	5.6	7.1	5810	1106	4.7	6.0								
2	7300	1216	7	8.9	6300	1180	6.1	7.8	5450	1145	4.9	6.3												
2.2	6400	1218	6.2	7.9	5230	1184	5.1	6.5																
2.4	5400	1221	5.4	6.9																				
	1 Turn				2 Turns				3 Turns				4 Turns				5 Turns				6 Turns			

Chart shading corresponds to minimum horsepower requirements as defined below.
15 HP motor 10 HP motor 7.5 HP motor

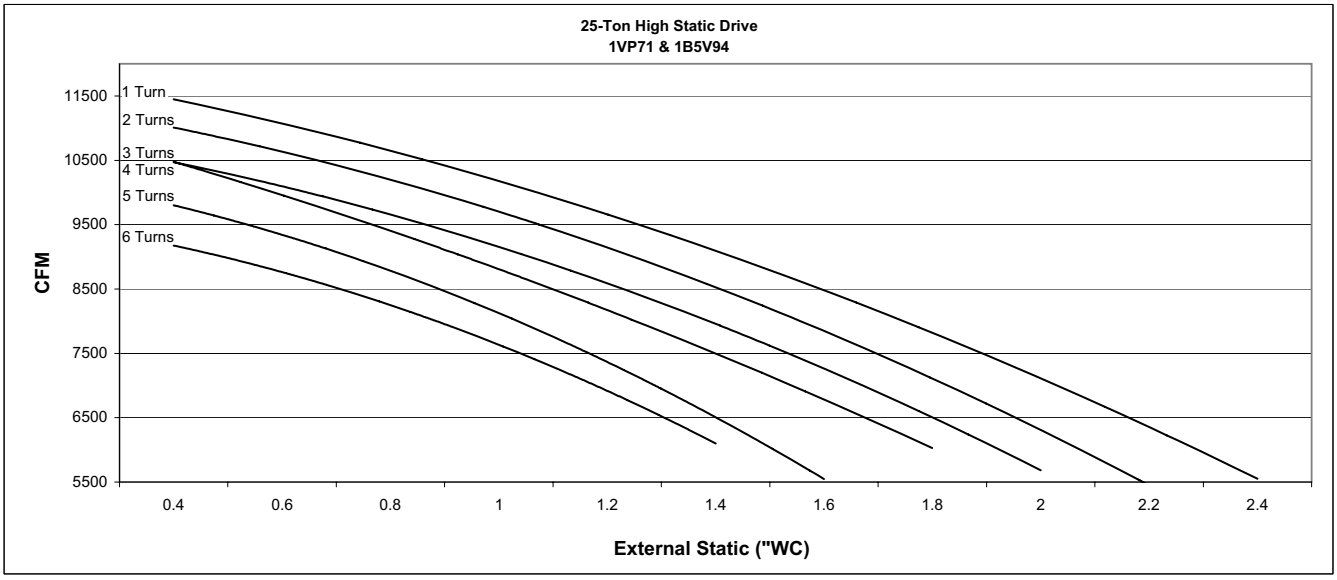


TABLE 25: STATIC RESISTANCES[1]

DESCRIPTION		RESISTANCE, IWG								
		CFM								
		15 TON			20 TON			25 TON		
		4500	5600	7500	6000	8000	9400	7500	10000	12500
WET INDOOR COIL		0.1	0.1	0.1	0.1	0.1	0.1	0.11	0.11	0.11
ELECTRIC HEAT OPTIONS	18 KW	0.3	0.35	0.3	0.35	0.40	0.45	0.31	0.45	0.55
	36 KW	0.32	0.4	0.37	0.4	0.48	0.5	0.38	0.5	0.6
	54 KW	0.38	0.45	0.49	0.45	0.52	0.57	0.5	0.6	0.7
	72 KW	0.38	0.45	0.49	0.45	0.52	0.57	0.5	0.6	0.7
ECONOMIZER OPTION		0.1	0.1	0.1	0.1	0.1	0.1	0.06	0.11	0.18
VERTICAL DUCT CONNECTIONS[2]		0.1	0.2	0.3	0.2	0.3	0.5	0.36	0.32	0.46

1. Deduct these resistance values from the available external static pressures shown in the respective Blower Performance Table (See Note 2 for exception.)
2. Since the resistance to air flow will be more for vertical duct connections than for side duct connections, deduct these pressures from the ESP values on the respective unit's blower performance table.

TABLE 26: POWER EXHAUST PERFORMANCE

MOTOR SPEED	STATIC RESISTANCE OF RETURN DUCTWORK, IWG									
	0.2		0.3		0.4		0.5		0.6	
	CFM	KW	CFM	KW	CFM	KW	CFM	KW	CFM	KW
HIGH*	5250	0.83	4500	0.85	4200	0.88	3750	0.93	3000	0.99
MEDIUM	4900	0.77	3900	0.79	3500	0.82	2900	0.85	-	-
LOW	4400	0.72	3700	0.74	3000	0.78	-	-	-	-

* Factory Setting
Power Exhaust motor is a 3/4 HP, PSC type with sleeve bearings, a 48 frame and inherent protection.

TABLE 27: BLOWER MOTOR AND DRIVE DATA

MODEL SIZE	DRIVE	BLOWER RANGE (RPM)	MOTOR[1]			ADJUSTABLE MOTOR PULLEY				FIXED BLOWER PULLEY				BELT (NOTCHED)		
			HP	FRAME	EFF. (%)	DESIG-NATION	OUTSIDE DIA. (IN.)	PITCH DIA. (IN.)	BORE (IN.)	DESIG-NATION	OUTSIDE DIA. (IN.)	PITCH DIA. (IN.)	BORE (IN.)	DESIG-NATION	PITCH LENGTH (IN.)	QTY.
15 TON	Standard	760/940	5	184 T	89.5	1VP56	5.35	4.3-5.3[2]	1-1/8	BK105	10.5	9.9	1	BX81	82.8	1
	High Speed Access	875/1150	7.5	213 T	91.7	1VP60	6.0	4.2-5.5	1-3/8	BK90	8.75	8.4				
20 TON	Standard	850/1010	7.5	213 T	89	1VP68	6.75	5.5-6.5[2]	1-3/8	BK110	10.75	10.4	1-3/16	BX81	82.8	1
	High Speed Access	950/1120	10			1VP71	7.1	5.4-6.6								
25 TON	Low Speed Drive	842/1003	7.5	254 T	89	1VP60	6.0	4.2-5.5	1-3/8	1B5V94	9.7	9.5	1-3/16	BX78	79.8	1
	Standard		15		91				1-5/8				1-7/16	BX81	82.8	
	High Speed Access	1020/1221				1VP71	7.1	5.5-6.5								

1. All motors have a nominal speed of 1800 RPM, a 1.15 service factor and a solid base. They can operate to the limit of their service factor because they are located in the moving air, upstream of any heating device.
2. Do NOT close this pulley below 1 turn open.

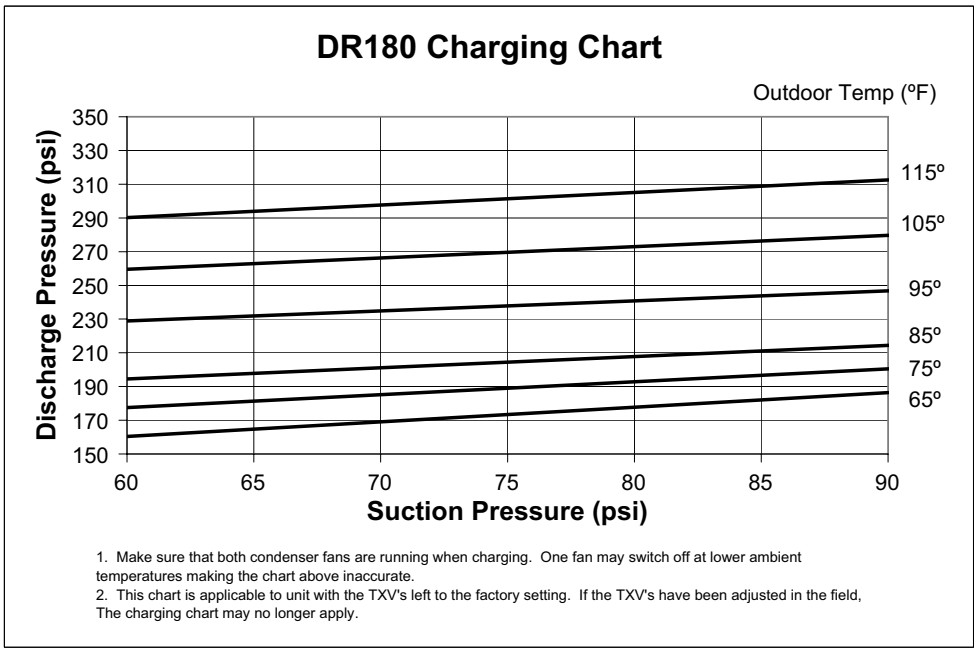


FIGURE 14 - CHARGING CHART - 15 TON

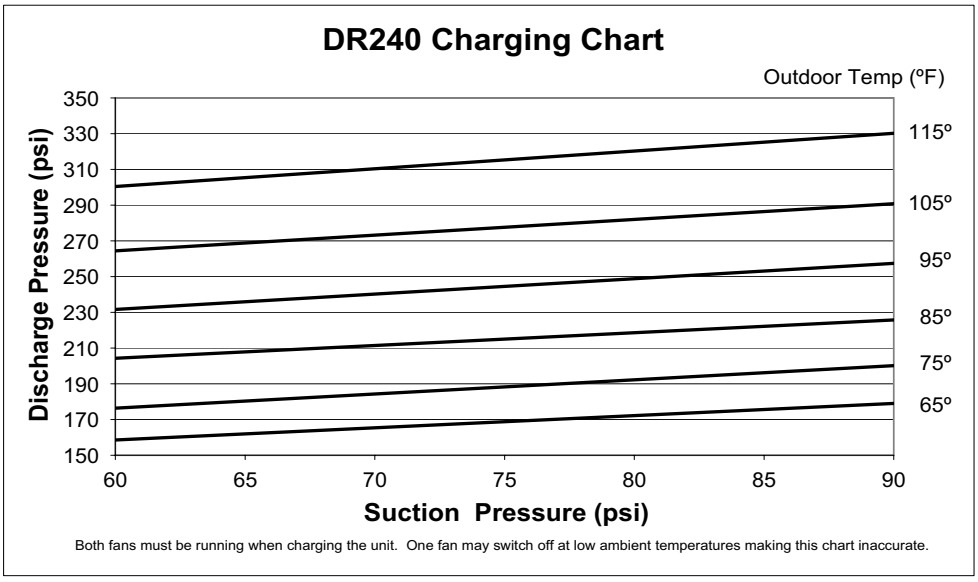


FIGURE 15 - CHARGING CHART - 20 TON

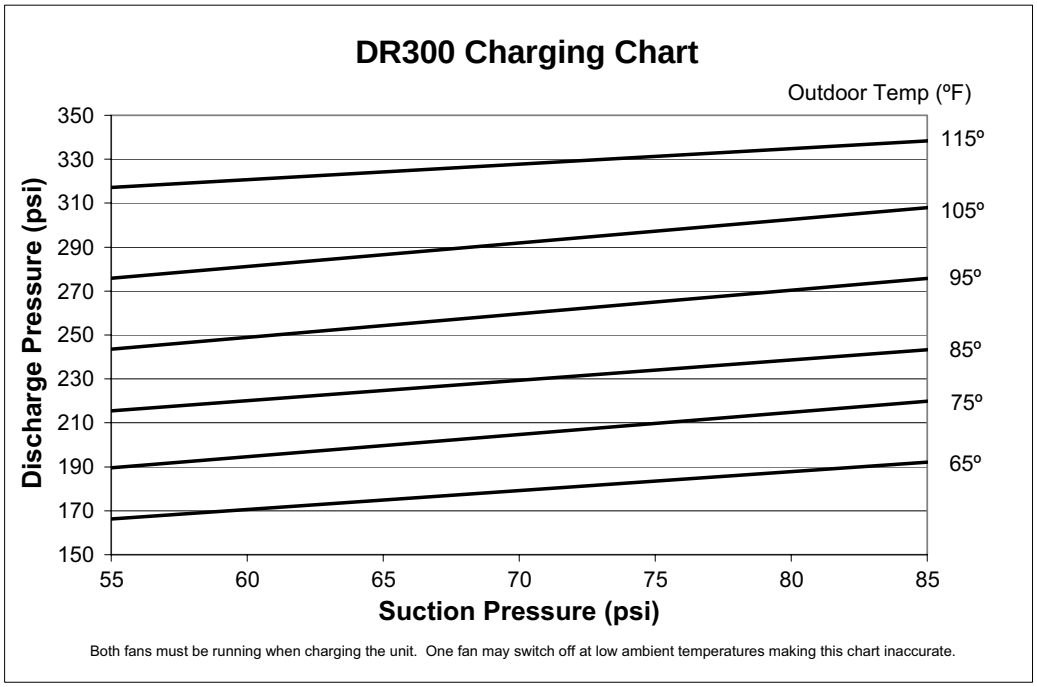


FIGURE 16 - CHARGING CHART - 25 TON

PHASING

Check for proper compressor rotation. If the blower or compressors rotate in the wrong direction at start-up, the electrical connection to the unit is misphased. Change the incoming line connection phasing to obtain proper rotation. (Scroll compressors operate in only one direction. If the scroll is drawing low amperage, has similar suction and discharge pressures, or producing a high noise level, the scroll is misphased).

⚠ CAUTION

Scroll compressors require proper rotation to operate correctly. Do not change the internal wiring to make the blower, condenser fans, or compressor rotate correctly. Change the incoming power to the main terminal block to obtain proper rotation.

CHECKING SUPPLY AIR CFM

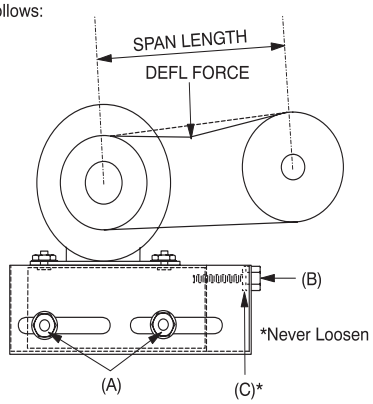
The RPM of the supply air blower will depend on the required CFM, the unit accessories or options and the static resistances of both the supply and the return air duct systems. With this information, the RPM for the supply air blower and the motor pulley adjustment (turns open) can be determined from the Blower Performance Data Tables.

Note the following:

1. The supply air CFM must be within the limitations shown in the Unit Application Data Table 1.
2. Pulleys can be adjusted in half turn increments.
3. The tension on the belt should be adjusted as shown in the Belt Adjustment Figure 17.

PROCEDURE FOR ADJUSTING BELT TENSION:

1. Loosen nuts (A) (top and bottom).
2. Adjust the tension by turning bolt (B).
3. Never loosen nuts (C) from each other.
4. Use a belt tension checker to apply a perpendicular force to be one belt at the midpoint of the span as shown. The deflection force should be applied until a specific deflection distance of 4mm (5/32") is obtained. To determine the deflection distance from normal position, use a straight edge from sheave to sheave as a reference line. The recommended deflection force is as follows:



Tension new belts at the max. deflection force recommended for the belt section. Check the belt tension at least two times during the first 24 hours of operation. Any re-tensioning should fall between the min. and max. deflection force values.

5. After adjusting, re-tighten nuts (A).

FIGURE 17 - BELT ADJUSTMENT

Start the supply air blower motor. Adjust the resistances in both the supply and the return air duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

To check the supply air CFM after the initial balancing has been completed:

1. Remove the two 5/16" dot plugs from the blower motor and the filter access panels shown in the Dimensions and Clearances Figure 12.
2. Insert at least 8" of 1/4 inch tubing into each of these holes for sufficient penetration into the air flow on both sides of the indoor coil.

NOTE: The tubes must be inserted and held in a position perpendicular to the air flow so that velocity pressure will not affect the static pressure readings.

3. Using an inclined manometer, determine the pressure drop across a dry evaporator coil. Since the moisture on an evaporator coil may vary greatly, measuring the pressure drop across a wet coil under field conditions would be inaccurate. To assure a dry coil, the compressors should be deactivated while the test is being run.

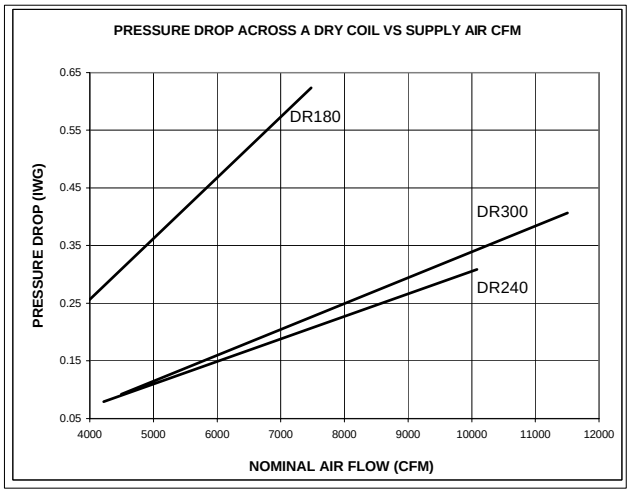


FIGURE 18 - PRESSURE DROP ACROSS A DRY INDOOR COIL VS SUPPLY AIR CFM FOR ALL UNIT TONNAGES

4. Knowing the pressure drop across a dry coil, the actual CFM through the unit can be determined from the curve in Pressure Drop vs. Supply Air CFM Figure 18.

⚠WARNING

Failure to properly adjust the total system air quantity and static pressure can result in extensive system damage.

After readings have been obtained, remove the tubes and reinstall the two 5/16" dot plugs that were removed in Step 1.

NOTE: DE-ENERGIZE THE COMPRESSORS BEFORE TAKING ANY TEST MEASUREMENTS TO ASSURE A DRY INDOOR COIL.

OPERATION

SEQUENCE OF OPERATIONS OVERVIEW

For these units, the thermostat makes a circuit between "R" and "Y1" for the first stage of cooling.

The call is passed to the unit control board (UCB), which then determines whether the requested operation is available and, if so, which components to energize.

For gas heating, the UCB monitors the "W1" call but does not handle the operation of the gas furnace. An ignition control board controls the gas heater operation.

For electric heat units, the UCB passes the call to the electric heater.

In both cases, when the "W1" call is sensed, the indoor air blower is energized following a specified heating delay.

If at any time a call for both heating and cooling are present, the heating operation will be performed. If operating, the cooling system is halted as with a completion of a call for cooling. Heating always takes priority.

COOLING SEQUENCE OF OPERATION

CONTINUOUS BLOWER

By setting the room thermostat fan switch to "ON," the supply air blower will operate continuously.

INTERMITTENT BLOWER

With the room thermostat fan switch set to "AUTO" and the system switch set to either the "AUTO" or "HEAT" settings, the blower is energized whenever a cooling or heating operation is requested. The blower is energized after any specified delay associated with the operation.

When energized, the indoor blower has a minimum run time of 30 seconds. Additionally, the indoor blower has a delay of 10 seconds between operations.

NO OUTDOOR AIR OPTIONS

When the thermostat calls for the first stage of cooling, the low-voltage control circuit from "R" to "Y1" and "G" is completed. For first stage cooling, compressor #1, condenser fan motor #1, and condenser fan motor #2 (if the ambient temperature is above 60°F), is energized. After completing the specified fan on delay for cooling, the UCB will energize the blower motor.

When the thermostat calls for the second stage of cooling, the low-voltage control circuit from "R" to "Y2" is completed. Compressor #2, condenser fan motor #3, and condenser fan motor #4 (if the ambient temperature is above 60°F), is energized, provided it has not been locked-out.

If there is an initial call for both stages of cooling, the UCB will delay energizing compressor #2 by 30 seconds in order to avoid a higher than normal current in rush.

Once the thermostat has been satisfied, it will de-energize Y1 and Y2. If the compressors have satisfied their minimum run times, the compressors and condenser fans are de-energized. Otherwise, the unit operates each cooling system until the minimum run times for the compressors have been completed. Upon the final compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling.

To be available, a compressor must not be locked-out due to a high or low-pressure switch or freezestat trip and the anti-short cycle delay (ASCD) must have elapsed.

ECONOMIZER WITH SINGLE ENTHALPY SENSOR -

When the room thermostat calls for "first-stage" cooling, the low voltage control circuit from "R" to "G" and "Y1" is completed. The UCB energizes the blower motor (if the fan switch on the room thermostat is set in the "AUTO" position) and drives the economizer dampers from fully closed to their minimum position. If the enthalpy of the outdoor air is below the setpoint of the enthalpy controller (previously determined), "Y1" energizes the economizer. The dampers will modulate to maintain a constant supply air temperature as monitored by the discharge air sensor. If the outdoor air enthalpy is above the setpoint, "Y1" energizes compressor #1, condenser fan motor #1, and condenser fan motor #2 (if the ambient temperature is above 60°F).

When the thermostat calls for "second-stage" cooling, the low voltage control circuit from "R" to "Y2" is completed. The UCB energizes the first available compressor If the enthalpy of the outdoor air is below the setpoint of the enthalpy controller (i.e. first stage has energized the economizer), "Y2" will energize compressor #1. If the outdoor air is above the setpoint, "Y2" will energize compressor #2.

Once the thermostat has been satisfied, it will de-energize Y1 and Y2. If the compressors have satisfied their minimum run times, the compressors and condenser fans are de-energized. Otherwise, the unit operates each cooling system until the minimum run times for the compressors have been completed. Upon the final compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling, and the economizer damper goes to the closed position. If the unit is in continues fan operation the economizer damper goes to the minimum position.

ECONOMIZER WITH DUAL ENTHALPY SENSORS -

The operation with the dual enthalpy sensors is identical to the single sensor except that a second enthalpy sensor is mounted in the return air. This return air sensor allows the economizer to choose between outdoor air and return air, whichever has the lowest enthalpy value, to provide maximum operating efficiency.

ECONOMIZER (SINGLE OR DUAL) WITH POWER EXHAUST -

This system operates as specified above with one addition. The power exhaust motor is energized 45 seconds after the actuator position exceeds the exhaust fan setpoint on the economizer control. When the power exhaust is operating, the second stage of mechanical cooling will not operate. As always, the "R" to "G" connection provides minimum position but does not provide power exhaust operation.

MOTORIZED OUTDOOR AIR DAMPERS -

This system operation is the same as the units with no outdoor air options with one exception. When the "R" to "G" circuit is complete, the motorized damper drives open to a position set by the thumbwheel on the damper motor. When the "R" to "G" circuit is opened, the damper spring returns fully closed.

COOLING OPERATION ERRORS

Each cooling system is monitored for operation outside of the intended parameters. Errors are handled as described below. All system errors override minimum run times for compressors.

HIGH-PRESSURE LIMIT SWITCH

During cooling operation, if a high-pressure limit switch opens, the UCB will de-energize the associated compressor, initiate the ASCD (Anti-short cycle delay), and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a high-pressure switch open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (see Table 33). If the other compressor is inactive, the condenser fans will be de-energized.

LOW-PRESSURE LIMIT SWITCH

The low-pressure limit switch is not monitored during the initial 30 seconds of a cooling system's operation. For the following 30 seconds, the UCB will monitor the low-pressure switch to ensure it closes. If the low-pressure switch fails to close after the 30-second monitoring phase, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

Once the low-pressure switch has been proven (closed during the 30-second monitor period described above), the UCB will monitor the low-pressure limit switch for any openings. If the low-pressure switch opens for greater than 5 seconds, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a low-pressure switch open three times within one hour of operation, the UCB will lock-out the associated compressor and flash a code (Table 33). If the other compressor is inactive, the condenser fans will be de-energized.

FREEZESTAT

During cooling operation, if a freezestat opens, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a freezestat open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (Table 33). If the other compressor is inactive, the condenser fans will be de-energized.

LOW AMBIENT COOLING

To determine when to operate in low ambient mode, the UCB has a pair of terminals connected to a temperature-activated switch set at 30ºF. When the low ambient switch is closed and the thermostat is calling for cooling, the UCB will operate in the low ambient mode.

Low ambient mode operates the compressors in this manner: 10 minutes on, 5 minutes off. The indoor blower is operated throughout the cycle. The 5-minute off period is necessary to defrost the indoor coil.

Low ambient mode always begins with compressor operation. Compressor minimum run time may extend the minutes of compressor operation. The defrost cycle will begin immediately following the elapse of the minimum run time.

When operating in low ambient mode, the UCB will not lockout the compressors due to a freezestat trip. However, a freezestat trip will de-energize the associated compressor. If the call for cooling is still present at the end of the ASCD and the freezestat has closed, the unit will resume operation.

SAFETY CONTROLS

The unit control board monitors the following inputs for each cooling system:

1. A suction line freezestat to protect against low evaporator temperatures due to a low airflow or a

low return air temperature, (opens at 26 ± 5 °F and resets at 38 ± 5°F).

2. A high-pressure switch to protect against excessive discharge pressures due to a blocked condenser coil or a condenser motor failure, (opens at 405 ± 7 psig and resets at 265 ± 20 psig).

3. A low-pressure switch to protect against loss of refrigerant charge, (opens at 22 ± 5 psig and resets at 45 ± 5 psig).

The above pressure switches are hard-soldered to the unit. The refrigeration systems are independently monitored and controlled. On any fault, only the associated system will be affected by any safety/preventive action. The other refrigerant system will continue in operation unless it is affected by the fault as well.

The unit control board monitors the temperature limit switch of electric heat units and the temperature limit switch and the gas valve of gas furnace units.

COMPRESSOR PROTECTION

The compressors also have inherent (internal) protection. If there is an abnormal temperature rise in a compressor, the protector will open to shut down the compressor. The UCB incorporates features to minimize compressor wear and damage. An anti-short cycle delay (ASCD) is utilized to prevent operation of a compressor too soon after its previous run. Additionally, a minimum run time is imposed any time a compressor is energized.

The ASCD is initiated on unit start-up and on any compressor reset or lock-out.

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 33.

RESET

Remove the call for cooling, by raising thermostat setting higher than the conditioned space temperature. This resets any pressure or freezestat flash codes.

REHEAT MODE SEQUENCE OF OPERATION

The reheat control board allows the user to select two different modes of operation via a jumper connection on the board. (See Figure 19.) Each mode is described below. Refer to Figures 19 - 21 when reading this section.

“NORMAL” MODE

When the reheat control board (RCB) detects a need for dehumidification (24VAC) at "HUM" via the field supplied dehumidistat connected to RHTB-1 and RHTB-2 and there is not a call for cooling, it energizes the hot gas relay (HGR), which energizes the 3-way valve (SOL 3), the condenser coil valve (SOL 2), and de-energizes the reheat coil bleed valve (SOL 1). The Y1 signal is passed to the unit control board (UCB), which engages circuit # 1, resulting in circuit #1 reheat mode operation.

When the room thermostat calls for first stage cooling, with or without a call for dehumidification, the RCB senses a signal through "Y1", de-energizing the HGR, which de-energizes SOL 3 and SOL 2, and energizes SOL 1, engaging circuit # 1, resulting in circuit #1 cooling mode operation.

When the room thermostat calls for second stage cooling, the RCB senses a signal through "Y1" & "Y2" and engages circuit #1 and circuit #2 in the cooling mode.

Indoor blower operation is initiated upon a call for first stage cooling, second stage cooling or dehumidification.

Anytime there is a call for 2 stages of cooling, the unit will not operate in the reheat mode, even if there is a call for dehumidification at "HUM".

The unit will not operate in the reheat mode if there is any call for heating.

On units with economizers, the unit will not operate in the reheat mode if there is a call for cooling and the economizer is operating as first stage of cooling.

All safety devices function as previously described.

"ALTERNATE” MODE

When the RCB detects a need for dehumidification (24VAC) at "HUM" via the field supplied dehumidistat connected to RHTB-1 and RHTB-2, and there is not a call for cooling, it energizes the HGR, which energizes the SOL 3, SOL 2, and de-energizes SOL 1. The unit then operates with circuit #1 in reheat mode and circuit #2 in cooling mode.

When the room thermostat calls for first stage cooling while there is still a call for dehumidification, no operational change is made. The call for cooling is ignored and the unit continues to operate with circuit #1 in reheat mode and circuit #2 in cooling mode.

When the room thermostat calls for second stage cooling, the RCB senses a signal through "Y1" & "Y2" and de-energizes the HGR, which de-energizes SOL 3 and SOL 2, and energizes SOL 1. Both circuits operate in the cooling mode.

Indoor blower operation is initiated upon a call for first stage cooling, second stage cooling or dehumidification.

Anytime there is a call for 2 stages of cooling, the unit will not operate in the reheat mode, even if there is still a call for dehumidification at "HUM".

The unit will not operate in the reheat mode if there is any call for heating.

All safety devices function as previously described.

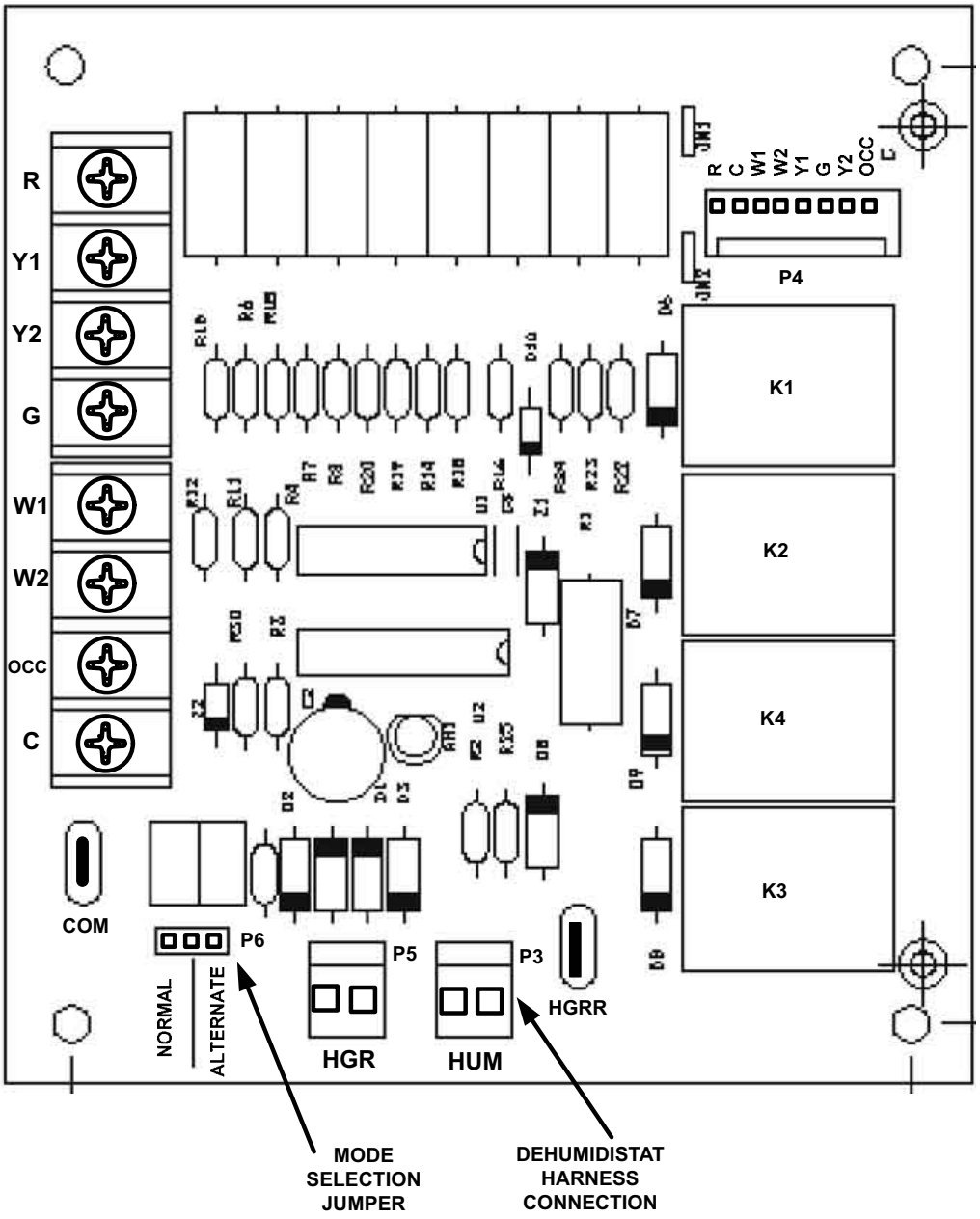


FIGURE 19 - REHEAT CONTROL BOARD

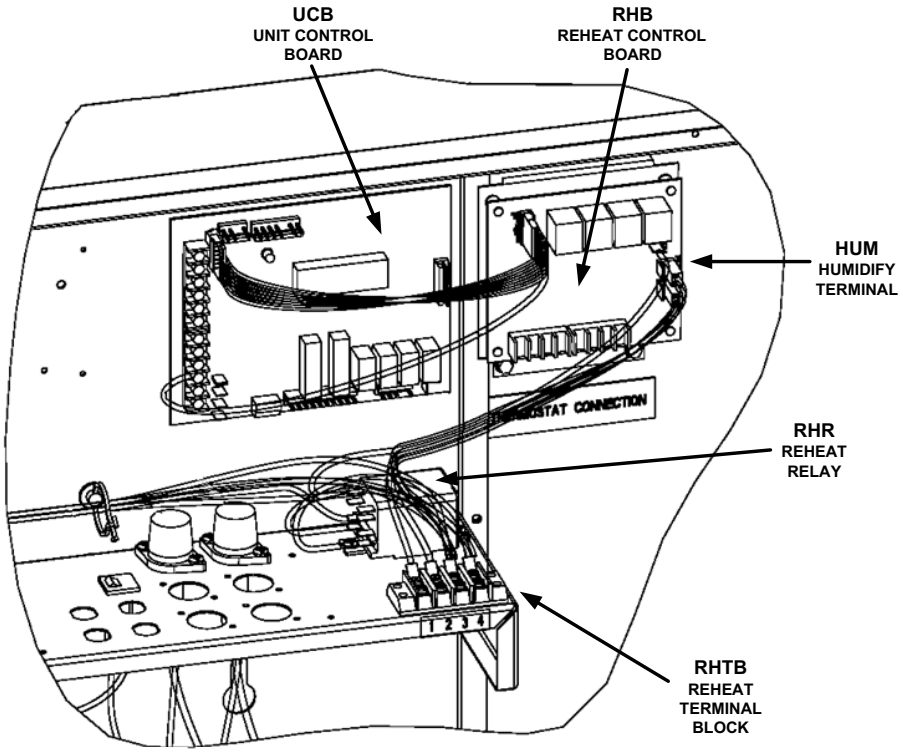


FIGURE 20 - REHEAT CONTROLS - PART 1

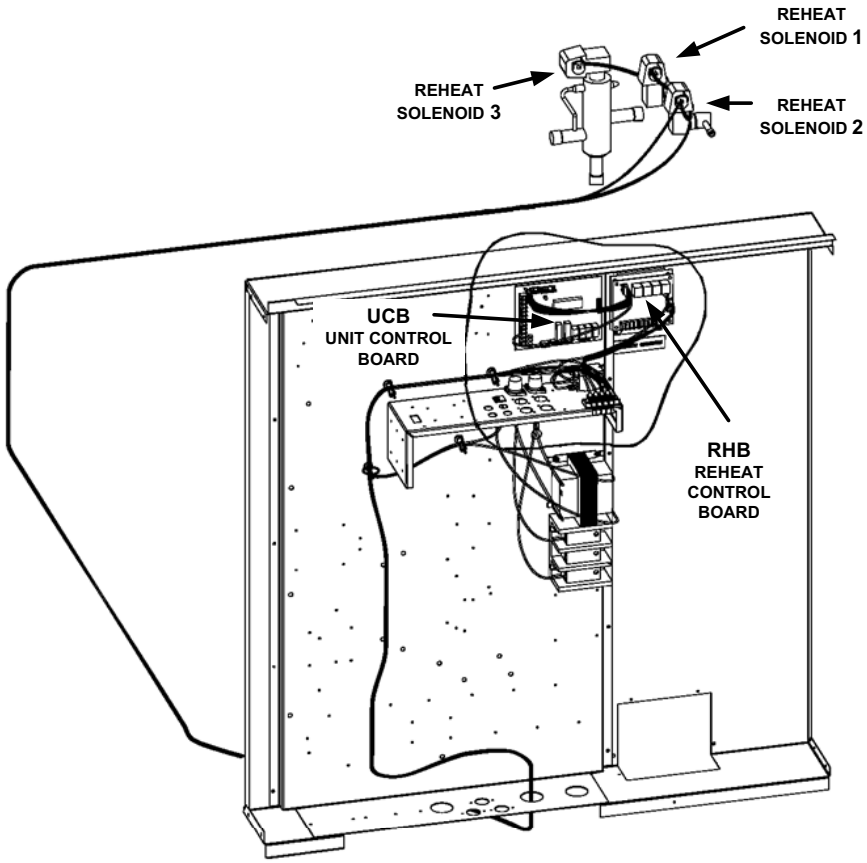


FIGURE 21 - REHEAT CONTROLS - PART 2

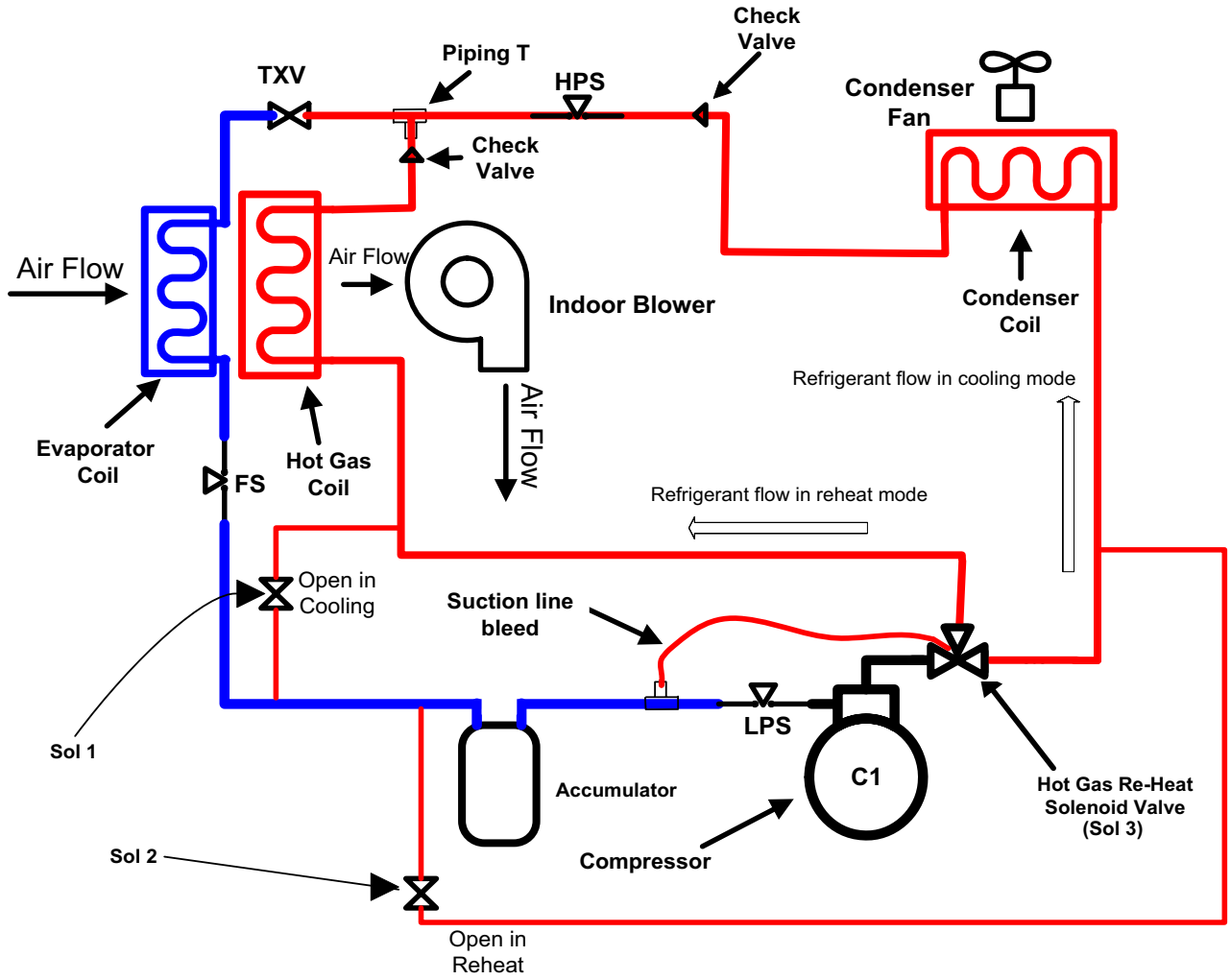


FIGURE 22 - SYSTEM PIPING SCHEMATIC

ELECTRIC HEATING SEQUENCE OF OPERATIONS

The following sequence describes the operation of the electric heat section.

Single-stage heating (applies only to 18 KW heater, all other heaters MUST use a two-stage thermostat):

a. Upon a call for heat by the thermostat, the heater contactor (6M) will be energized. After completing the specified fan on delay for heating, the UCB will energize the blower motor.

b. The thermostat will cycle the electric heat to satisfy the heating requirements of the conditioned space.

Two-stage heating (applies to all heaters except 18 KW):

a. Upon a call for first-stage heat by the thermostat, the heater contactor (6M) (6M & 7M on 72 KW, 240V) will be energized. After completing the specified fan on delay for heating, the UCB will energize the blower motor.

   If the second stage of heat is required, heater contactor (7M) will be energized. Note that on the 54 KW, 240V heater, heater contactors (7M & 8M) will be energized and on the 72 KW, 240V heater, heater contactors (8M & 9M) will be energized. After completing the specified fan on delay for heating, the UCB will energize the blower motor.

b. The thermostat will cycle the electric heat to satisfy the heating requirements of the conditioned space.

NOTE: All 240 & 480V heaters are provided with manual reset backup protection limits. These will de-energize the heaters should the primary limit fail to open or the contactors fail to open in a failure mode.

HEATING OPERATION ERRORS

TEMPERATURE LIMIT

If the UCB senses zero volts from the high temperature limit, the indoor blower motor is immediately energized.

This limit is monitored regardless of unit operation status, i.e. the limit is monitored at all times.

If the temperature limit opens three times within one hour, it will lock-on the indoor blower motor and a flash code is initiated (See Table 33).

SAFETY CONTROLS

The unit control board monitors the temperature limit switch of electric heat units.

The control circuit includes the following safety controls:

1. Temperature Limit Switch (TLS 1, 2).

   This control is located inside the heater compartment and is set to open at the temperature indicated in the Limit Control Setting Table 28. It resets automatically. The limit switch operates when a high temperature condition, caused by inadequate supply air flow occurs, thus shutting down the heater and energizing the blower.

2. Temperature Limit Switch (TLS 3, 4, 5 and 6).

   This control is located inside the heater compartment and is set to open at the temperature indicated in the Limit Control Setting Table 28. It is a manual reset limit. These limit switches will de-energize the heaters should the primary limit fail to open or the contactors fail to open in a failure mode.

TABLE 28: LIMIT CONTROL SETTING

UNIT (Tons)	VOLTAGE	HEATER kW	TEMPERATURE LIMIT SWITCH 1, 2 OPENS, ºF	TEMPERATURE LIMIT SWITCH 3, 4, 5, 6 OPENS, ºF
15	240	18	120	170
		36	120	170
		54	120	170
		72	120	170
20, 25	240	18	140	200
		36	140	200
		54	140	200
		72	140	200
15, 20, 25	460	18	120	170
		36	120	170
		54	120	170
		72	120	170
15, 20, 25	600	18	120	-
		36	120	-
		54	120	-
		72	120	-

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 33.

RESET

Remove the call for heating by lowering the thermostat setting lower than the conditioned space temperature. This resets any flash codes.

HEAT ANTICIPATOR SETPOINTS

It is important that the anticipator setpoint be correct. Too high of a setting will result in longer heat cycles and a greater temperature swing in the conditioned space. Reducing the value below the correct setpoint will give shorter "ON" cycles and may result in the lowering of the temperature within the conditioned space. Refer to Table 29 for the required heat anticipator setting.

TABLE 29: ELECTRIC HEAT ANTICIPATOR SETPOINTS

HEATER KW	VOLTAGE	SETTING, AMPS	
		TH1	TH2
18	208/230-3-60	0.29	-
36		0.29	0.29
54		0.29	0.58
72		0.29	0.58
18	460-3-60	0.29	-
36		0.29	0.29
54		0.29	0.29
72		0.29	0.29
18	575-3-60	0.29	-
36		0.29	0.29
54		0.29	0.29
72		0.29	0.29

GAS HEATING SEQUENCE OF OPERATIONS

The following sequence describes the operation of the gas heat section.

When the thermostat calls for the first stage of heating, the low-voltage control circuit from "R" to "W1" and "G" is completed, thru the UCB. The heat relay "RW1" is energized. The "RW1-2" contacts close energizing the draft motor control. The draft motor control contacts close and start the draft motor. As the speed of the draft motor reaches approximately 2500 RPM, the centrifugal switch contact, located on the end of the draft motor shaft, closes to power the first stage ignition module "IC1", thru the "RW1-1 contacts.

Ignition module "IC1" will immediately start the first stage igniter sparking and will open the redundant valve located inside the first stage main gas valve "GV1" to allow a flow of gas to only the first stage carryover tube. Only after the pilot flame has been ignited and the presence of pilot flame detected at the "IC1" by a signal sent back through the flame sensor is sparking terminated and the first stage main gas valve opened.

Gas flows into each of the main burners and is ignited from the carryover tube flame.

After completing the specified fan on delay for heating, the UCB will energize the blower motor.

If "IC1" fails to detect a pilot flame, it will continue to try for a maximum of 85 seconds to ignite the pilot tube. If the pilot flame is not detected, then "IC1" will lock out first stage furnace operation for five minutes or until 24V power is removed from the module either at the unit or by resetting the room thermostat.

When the thermostat calls for the second stage of heating, the low-voltage control circuit from "R" to "W2" is completed, thru the UCB. Heat relay "RW2" is energized. The "RW2-1" contact is closed energizing the second stage ignition module "IC2". "IC2" will immediately start the second stage igniter sparking and will open the redundant valve located inside the second stage main gas valve "GV2" to allow a flow of gas to the second stage carryover tube. Only after the pilot flame has been ignited and the presence of pilot flame detected at "IC2" by a signal sent back through the flame sensor is sparking terminated and the main gas valve opened.

Gas flows into each of the second stage main burners and is ignited from the carryover tube flame.

If "IC2" fails to detect a pilot flame, it will continue to try for a maximum of 85 seconds to ignite the pilot tube. If the pilot flame is not detected, then "IC2" will lock out first stage furnace operation for five minutes or until 24V power is removed from the module either at the unit or by resetting the room thermostat.

NOTE: That the second stage furnace can operate even if first stage has locked out.

When the thermostat satisfies de-energizing the "RW2"and "RW1", thus opening all gas valves. The blower motor will continue to run after the furnace is shut down until the specified fan off delay for heating has been satisfied. The UCB will de-energize the blower motor.

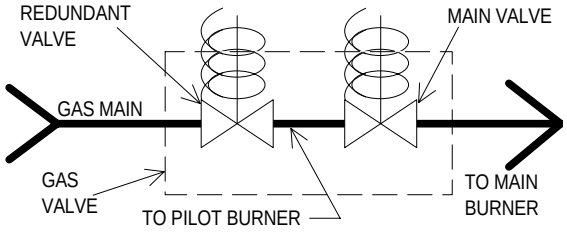


FIGURE 23 - GAS VALVE PIPING

When the thermostat calls for the first stage of heating, the low-voltage control circuit from "R" to "W1" is completed. A call for heat passes through the UCB to the ignition control board (ICB). The UCB monitors the "W1" call and acts upon any call for heat. Once voltage has been sensed at “W1”, the UCB will initiate the fan on delay for heating, energizing the indoor blower after the specified delay has elapsed.

When the thermostat has been satisfied, heating calls are ceased. The GV is immediately de-energized. The blower is de-energized after the fan off delay for heating has elapsed. The draft motor performs a 25-second post purge.

GAS HEATING OPERATION ERRORS

TEMPERATURE LIMIT

If the UCB senses zero volts from the high temperature limit, the indoor blower motor is immediately energized. When the UCB again senses 24 volts from the temperature limit, the draft motor will perform a 25-second post-purge and the indoor blower will be de-energized following the elapse of the fan off delay for heating.

This limit is monitored regardless of unit operation status, i.e. the limit is monitored at all times.

If the temperature limit opens three times within one hour, it will lock-on the indoor blower motor and a flash code is initiated (See Table 33).

GAS VALVE

The UCB continuously monitors the GV. Any time the UCB senses voltage at the GV without a call for heat for a continuous five-minute period, the UCB will lock-on the indoor blower and a flash code is initiated (Table 33). When voltage is no longer sensed at the GV, the UCB will de-energize the indoor blower following the elapse of the fan off delay for heating.

If voltage has been sensed at the GV for at least 15 seconds during the fan on delay for heating and GV voltage or "W1" is lost, the indoor blower is forced on for the length of the fan off delay for heating.

SAFETY CONTROLS

The unit control board monitors the temperature limit switch and the gas valve of gas furnace units.

The control circuit includes the following safety controls:

1. Limit Control (LS).

   This control is located inside the heat exchanger compartment and is set to open at the temperature indicated in the Limit Control Setting Table 30. It resets automatically. The limit switch operates when a high temperature condition, caused by inadequate supply air flow occurs, thus shutting down the ignition control and closing the main gas valves and energizing the blower.

2. Centrifugal Switch (CS).

   If the draft motor should fail, the centrifugal switch attached to the shaft of the motor prevents the ignition controls and gas valves from being energized.

3. Redundant Gas Valve.

   There are two separate gas valves in the furnace. Each valve contains a main and a redundant valve. The redundant valves are located upstream of the main gas valves. Should either or both of the main gas valves fail in the open position the redundant valves serve as back-ups and shut off the flow of gas.

4. Flame Sensor Rod / 100% Ignition Control Lock-Out.

   The flame rods and controls are located per Proper Flame Adjustment Figure 26. If an ignition control fails to detect a signal from the flame sensor indicating the pilot flame is properly ignited, then the main gas valve will not open. It will continue to try and ignite the pilot for a maximum of 85 seconds, then if the pilot flame is not detected, the ignition control will lock out furnace operation until 24V power is removed from the module either at the unit or by resetting the room thermostat.

5. Rollout Switch.

   This switch is located above the main burners in the control compartment, which in the event of a sustained main burner rollout shuts off and locks out both ignition controls closing both gas valves. The ignition controls lock out furnace operation until 24V power is removed from the controls either at the unit or by resetting the room thermostat.

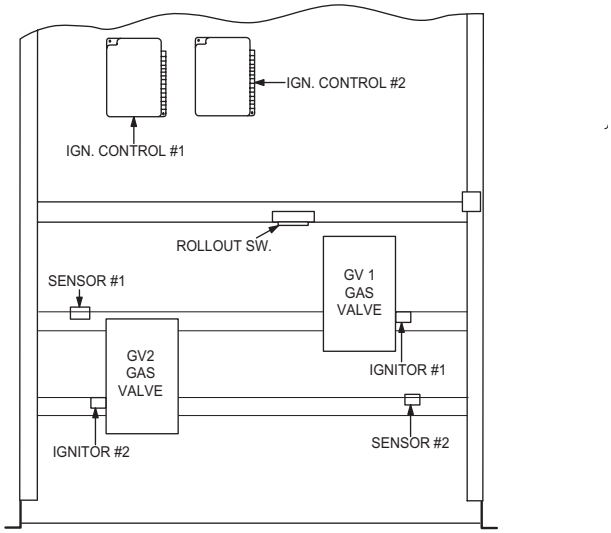
NOTE: The auto reset rollout switch must reset before allowing furnace operation.

6. Auxiliary limit switch (AUX) -

   This control is located inside the heat exchanger compartment and is set to open at 190°F. It is a manual reset switch. If AUX trips, then the primary limit has not functioned correctly. Replace the primary limit.

TABLE 30: LIMIT CONTROL SETTING

UNITS (Tons)	CAPACITY, MBH		LIMIT CONTROL OPENS, ºF
	INPUT	OUTPUT	
15, 20, 25	300	240	195
15, 20, 25	400	320	195



BURNER COMPARTMENT

FIGURE 24 - GAS VALVE AND CONTROLS

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 33.

RESETS

Remove the call for heating by lowering the thermostat setting lower than the conditioned space temperature. This resets any flash codes.

HEAT ANTICIPATOR SETPOINTS

It is important that the anticipator setpoint be correct. Too high of a setting will result in longer heat cycles and a greater temperature swing in the conditioned space. Reducing the value below the correct setpoint will give shorter "ON" cycles and may result in the lowering of the temperature within the conditioned space.

TABLE 31: GAS HEAT ANTICIPATOR SETPOINTS

GAS VALVE	ANTICIPATOR SETPOINT	
	1st STAGE	2nd STAGE
Honeywell VR8440	0.30 amp	0.11 amp
White-Rodgers 36C68		

START-UP (COOLING)

PRESTART CHECK LIST

After installation has been completed:

1. Check the electrical supply voltage being supplied. Be sure that it is the same as listed on the unit nameplate.
2. Set the room thermostat to the off position.
3. Turn unit electrical power on.
4. Set the room thermostat fan switch to on.
5. Check indoor blower rotation.
   - If blower rotation is in the wrong direction. Refer to Phasing Section in general information section.
   - Check blower drive belt tension.
6. Check the unit supply air (CFM). See "CHECKING SUPPLY AIR CFM" on page 52.
7. Measure evaporator fan motor's amp draw.
8. Set the room thermostat fan switch to off.
9. Turn unit electrical power off.

OPERATING INSTRUCTIONS

1. Turn unit electrical power on.
2. Set the room thermostat setting to lower than the room temperature.
3. First stage compressors will energize after the built-in time delay (five minutes).
4. The second stage of the thermostat will energize second stage compressor if needed.

POST START CHECK LIST

1. Verify proper system pressures for both circuits.
2. Measure the temperature drop across the evaporator coil.
3. Measure the system Amperage draw across all legs of 3 phase power wires.
4. Measure the condenser fan amp draw.

SHUT DOWN

1. Set the thermostat to highest temperature setting.
2. Turn off the electrical power to the unit.

START-UP (GAS HEAT)

PRE-START CHECK LIST

Complete the following checks before starting the unit.

1. Check the type of gas being supplied. Be sure that it is the same as listed on the unit nameplate.
2. Make sure that the vent and combustion air hoods have been properly installed.

OPERATING INSTRUCTIONS

⚠ CAUTION

This furnace is equipped with an intermittent pilot and automatic re-ignition system. DO NOT attempt to manually light the pilot.

TO LIGHT PILOT AND MAIN BURNERS:

1. Turn “off” electric power to unit.
2. Turn room thermostat to lowest setting.
3. Turn gas valve knob or switch to “on” position.
4. Turn “on” electric power to unit.
5. Set room thermostat to desired temperature. (If thermostat “set” temperature is above room temperature, pilot burner ignition will occur and, after an interval to prove pilot flame, main burners will ignite).

TO SHUT DOWN:

1. Turn “off” electric power to unit.
2. Depress knob of gas valve while turning to “off” position, or turn gas valve switch to “off” position.

POST-START CHECK LIST (GAS)

After the entire control circuit has been energized and the heating section is operating, make the following checks:

1. Check for gas leaks in the unit piping as well as the supply piping.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. Use a commerically available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

2. Check for correct manifold gas pressures. See “Checking Gas Input” page 65.
3. Check the supply gas pressure. It must be within the limits shown on rating nameplate. Supply pressure should be checked with all gas appliances in the building at full fire. At no time should the standby gas line pressure exceed 13", nor the operating pressure drop below 5.0" for natural gas units. If gas pressure is outside these limits, contact the local gas utility for corrective action.

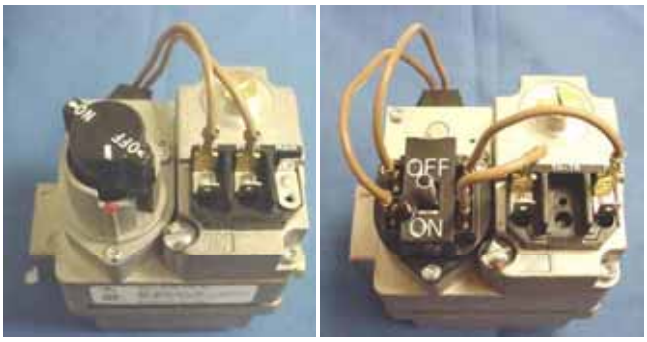


FIGURE 25 - TYPICAL GAS VALVES

MANIFOLD GAS PRESSURE ADJUSTMENT

Small adjustments to the high-fire gas flow may be made by turning the pressure regulator adjusting screw on the automatic gas valve.

Adjust as follows:

1. Remove the cap on the regulator. It's located next to the push-on electrical terminals.

2. To decrease the gas pressure, turn the adjusting screw counterclockwise.

3. To increase the gas pressure, turn the adjusting screw clockwise.

NOTE: The correct manifold pressure for these furnaces is 3.65 IWG ±0.3.

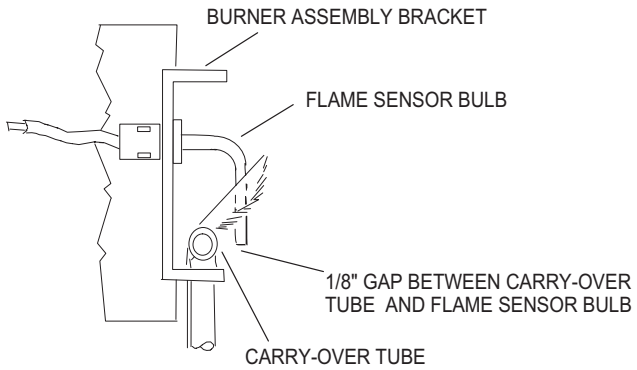


FIGURE 26 - PROPER FLAME ADJUSTMENT

PILOT CHECKOUT

The pilot flame should envelope the end of the flame sensor. To adjust pilot flame, (1) remove pilot adjustment cover screw, (2) increase or decrease the clearance for air to the desired level, (3) be sure to replace cover screw after adjustment to prevent possible gas leakage.

Put the system into operation and observe through complete cycle to be sure all controls function properly.

BURNER INSTRUCTIONS

To check or change burners, pilot or orifices, CLOSE MAIN MANUAL SHUT-OFF VALVE AND SHUT OFF ALL ELECTRIC POWER TO THE UNIT.

1. Remove the screws holding either end of the manifold to the burner supports.

2. Open the union fitting in the gas supply line just upstream of the unit gas valve and downstream from the main manual shut-off valve.

3. Remove the gas piping closure panel.

4. Disconnect wiring to the gas valves and spark ignitors. Remove the manifold-burner gas valve assembly by lifting up and pulling back.

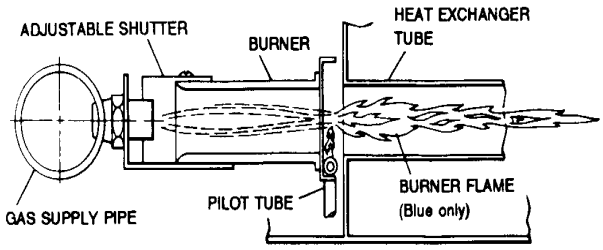


FIGURE 27 - TYPICAL FLAME APPEARANCE

Burners are now accessible for service.

Reverse the above procedure to replace the assemblies. Make sure that burners are level and seat at the rear of the heat exchanger.

BURNER AIR SHUTTER ADJUSTMENT

Adjust burner shutters so no yellow flame is observed in the heat exchanger tubes.

CHECKING GAS INPUT

NATURAL GAS

1. Turn off all other gas appliances connected to the gas meter.

2. With the furnace turned on, measure the time needed for one revolution of the hand on the smallest dial on the meter. A typical gas meter usually has a 1/2 or a 1 cubic foot test dial.

3. Using the number of seconds for each revolution and the size of the test dial increment, find the cubic feet of gas consumed per hour from the Gas Rate - Cubic Feet Per Hour Table 32.

If the actual input is not within 5% of the furnace rating (with allowance being made for the permissible range of the regulator setting), replace the orifice spuds with spuds of the proper size.

NOTE: To find the Btu input, multiply the number of cubic feet of gas consumed per hour by the Btu content of the gas in your particular locality (contact your gas company for this information - it varies widely from city to city.)

TABLE 32: GAS RATE - CUBIC FEET PER HOUR

Seconds for One Rev.	Size of Test Dial	
	1/2 cu. ft.	1 cu. ft.
4	450	900
6	300	600
8	228	450
10	180	360
12	150	300
14	129	257
16	113	225
18	100	200
20	90	180
22	82	164
24	75	150
26	69	138
28	64	129

Example: By actual measurement, it takes 13 seconds for the hand on the 1-cubic foot dial to make a revolution with just a 300,000 Btuh furnace running. Read across to the column in the table above, headed "1 Cubic Foot", where you will see that 278 cubic feet of gas per hour are consumed by the furnace at that rate. Multiply 278 x 1050 (the Btu rating of the gas obtained from the local gas company). The result is 292,425 Btuh, which is close to the 300,000 Btuh rating of the furnace.

ADJUSTMENT OF TEMPERATURE RISE

The temperature rise (or temperature difference between the return air and the heated air from the furnace) must lie within the range shown on the rating plate and the data in the Gas Heat Application Table 4.

$$CFM = \frac{\text{Btuh Input x } 0.8}{108 \; x \; {}^{o}F \; Temp. \; Rise}$$

After the temperature rise has been determined, the cfm can be calculated as follows:

After about 20 minutes of operation, determine the furnace temperature rise. Take readings of both the return air and the heated air in the ducts (about six feet from the furnace) where they will not be affected by radiant heat. Increase the blower cfm to decrease the temperature rise; decrease the blower cfm to increase the rise. Refer to the Blower Motor and Drive Data Table 27.

BELT DRIVE BLOWER

All units have belt drive single-speed blower motors. The variable pitch pulley on the blower motor can be adjusted to obtain the desired supply air CFM.

TROUBLESHOOTING

COOLING TROUBLESHOOTING GUIDE

⚠WARNING

Troubleshooting of components may require opening the electrical control box with the power connected to the unit. **Use extreme care when working with live circuits!** Check the unit nameplate for the correct line voltage and set the voltmeter to the correct range before making any connections with line terminals.

Shut off all electric power to the unit prior to any of the following maintenance procedures to prevent personal injury.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation, which could cause injury to person and/or damage unit components. Verify proper operation after servicing.

On calls for cooling, if the compressors are operating but the supply air blower motor does not energize after a short delay (the room thermostat fan switch is in the "AUTO" position).

1. Turn the thermostat fan switch to the ON position. If the supply air blower motor does not energize, go to Step 3.

2. If the blower motor runs with the fan switch in the ON position but will not run after the first compressor has energized when the fan switch is in the AUTO position, check the room thermostat for contact between R and G in the AUTO position during calls for cooling.

3. If the supply air blower motor does not energize when the fan switch is set to ON, check that line voltage is being supplied to the contacts of the M3, contactor, and that the contactor is pulled in. Check for loose wiring between the contactor and the supply air blower motor.

4. If M3 is pulled in and voltage is supplied to M3, lightly touch the supply air blower motor housing. If it is hot, the motor may be off on internal

protection. Cancel any thermostat calls and set the fan switch to AUTO. Wait for the internal overload to reset. Test again when cool.

5. If M3 is not pulled in, check for 24 volts at the M3 coil. If 24 volts are present at M3 but M3 is not pulled in, replace the contactor.

6. Failing the above, if there is line voltage supplied at M3, M3 is pulled in, and the supply air blower motor still does not operate, replace the motor.

7. If 24 volts is not present at M3, check that 24 volts is present at the UCB supply air blower motor terminal, “FAN”. If 24 volts is present at the FAN, check for loose wiring between the UCB and M3.

8. If 24 volts is not present at the “FAN” terminal, check for 24 volts from the room thermostat. If 24 volts are not present from the room thermostat, check for the following:

    a. Proper operation of the room thermostat (contact between R and G with the fan switch in the ON position and in the AUTO position during operation calls).

    b. Proper wiring between the room thermostat and the UCB.

    c. Loose wiring from the room thermostat to the UCB.

9. If 24 volts is present at the room thermostat but not at the UCB, check for proper wiring between the thermostat and the UCB, i.e. that the thermostat G terminal is connected to the G terminal of the UCB, and for loose wiring.

10. If the thermostat and UCB are properly wired, replace the UCB.

On calls for cooling, the supply air blower motor is operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position).

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling and the compressors will not immediately operate. If both stages of cooling are requested simultaneously and the economizer provides free cooling, following a short delay compressor #1 will be energized unless it is locked out. If compressor #1 is locked out, compressor #2 is energized. Compressor #2 is always energized in place of compressor #1 when compressor #1 is requested but locked out, unless this option has been disabled through computer communications.

2. If no economizer is installed or the economizer is not opening to provide free cooling and compressor #1 does not energize on a call for cooling, check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts are present and M1 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.

7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts is not present from the room thermostat, check for the following:

    a. 24 volts at the thermostat Y1 terminal.

    b. Proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2.

    c. Loose wiring from the room thermostat to the UCB.

8. If 24 volts is present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.

9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing an alarm code. If not, press and release the ALARMS button

on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, cancel any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lockouts, compressor #1 may be held off for the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.

12. *For units without economizers*:If 24 volts is present at the Y1 OUT terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.

13. *For units with economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. If nothing is found, the economizer actuator may have faulted and is failing to return the 24-volt “call” to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug. If compressor #1 energizes, there is a fault in the economizer wiring or actuator.

14. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local distributors can test the UCB for this programming.

15. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C1 terminal wire and jumper it to the Y1 terminal. DO NOT jump the Y1 to C1 terminals. If the compressor engages, the UCB has faulted.

16. If none of the above correct the error, replace the UCB.

On calls for the second stage of cooling, the supply air blower motor and compressor #1 are operating but compressor #2 is not (the room thermostat fan switch is in the “AUTO” position).

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling. If the second stage of cooling is requested, following a short delay, compressor #1 will be energized unless it is locked out. Typically, compressor #2 is energized only during free cooling if the call for the second stage of cooling persists for 20 minutes.

2. Compressor #2 will not energize simultaneously with compressor #1 if a call for both stages of cooling is received. The UCB delays compressor #2 by 30 seconds to prevent a power surge. If after the delay compressor #2 does not energize on a second stage call for cooling, check for line voltage at the compressor contactor, M2, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M2 is pulled in and voltage is supplied at M2, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M2 is not pulled in, check for 24 volts at the M2 coil. If 24 volts is present and M2 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M2, M2 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M2, check for 24 volts at the UCB terminal, C2. If 24 volts are present, check for loose wiring between C2 and the compressor contactor.

7. If 24 volts is not present at the C2 terminal, check for 24 volts from the room thermostat at the UCB Y2 terminal. If 24 volts is not present from the room thermostat, check for the following:

   a. 24 volts at the thermostat Y2 terminal.

   b. Proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2.

   c. Loose wiring from the room thermostat to the UCB.

8. If 24 volts is present at the UCB Y2 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS2, LPS2, and FS2 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS2 has opened, there will be 24 volts of potential between the LPS2 terminals.

9. If 24 volts is present at the UCB Y2 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, remove any call for cooling at the thermostat or by disconnecting the thermostat wiring at the Y2 UCB terminal. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #1 will be held off for the ASCD, and compressor #2 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y2 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local distributors can test the UCB for this programming.

12. If none of the above corrected the error, test the integrity of the UGB. Disconnect the C2 terminal wire and jumper it to the Y2 terminal. DO NOT jump the Y2 to C2 terminals. If the compressor engages, the UCB has faulted.

13. If none of the above correct the error, replace the UCB.

On a call for cooling, the supply air blower motor and compressor #2 are operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position).

1. Compressor #2 is energized in place of compressor #1 when compressor #1 is unavailable for cooling calls. Check the UCB for alarms indicating that compressor #1 is locked out. Press and release the ALARMS button if the LED is not flashing an alarm.

2. Check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts is present and M1 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.

7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts are not present at the UCB Y1 terminal, the UCB may have faulted. Check for 24 volts at the Y1 ECON terminal. If 24 volts is not present at Y1 “ECON”, the UCB has faulted. The UCB should de-energize all compressors on a loss of call for the first stage of cooling, i.e. a loss if 24 volts at the Y1 terminal.

8. If 24 volts are present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.

9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, remove any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #2 will be held off for the ASCD, and compressor #1 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.

12. *For units without economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.

    For units with economizers: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. The economizer board may have faulted and is not returning the 24 volts to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test the economizer board, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug.

13. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. They can be checked by local distributors.

14. If none of the above correct the error, replace the UCB.

GAS HEAT TROUBLESHOOTING GUIDE

⚠WARNING

Troubleshooting of components may require opening the electrical control box with the power connected to the unit. **Use extreme care when working with live circuits!** Check the unit nameplate for the correct line voltage and set the voltmeter to the correct range before making any connections with line terminals.

When not necessary, shut off all electric power to the unit prior to any of the following maintenance procedures so as to prevent personal injury.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation, which could cause injury to person and/or damage unit components. Verify proper operation after servicing.

NOTE: To find the Btu input, multiply the number of cubic feet of gas consumed per hour by the Btu content of the gas in your particular locality (contact your gas company for this information - it varies widely from city to city.).

⚠WARNING

The furnace may shut down on a high temperature condition during the procedure. If this occurs, the UCB energize the supply air blower motor until the high temperature limit has reset. Caution should be used at all times as the supply air blower may energize regardless of the room thermostat fan switch position.

On calls for heating, the draft motor operates and the furnace lights but the supply air blower motor does not energize after a short delay (the room thermostat fan switch is in “AUTO” position).

1. Place the thermostat fan switch in the “ON” position. If the supply air blower motor energizes, go to Step 10.

2. If the supply air blower motor does not energize when the fan switch is set to “ON,” check that line voltage is being supplied to the contacts of the M3 contactor, and that the contactor is pulled in. Check for loose wiring between the contactor and the supply air blower motor.

3. If M3 is pulled in and voltage is supplied at M3, lightly touch the supply air blower motor housing. If it is hot, the motor may be off on inherent protection. Cancel any thermostat calls and set the fan switch to “AUTO”, wait for the internal overload to reset. Test again when cool.

4. If M3 is not pulled in, check for 24 volts at the M3 coil. If 24 volts is present at M3 but M3 is not pulled in, replace the contactor.

5. Failing the above, if there is line voltage supplied at M3, M3 is pulled in, and the supply air blower motor still does not operate, replace the motor.

6. If 24 volts is not present at M3, check that 24 volts is present at the supply air blower motor terminal on the UCB. If 24 volts is present at the UCB terminal, check for loose wiring between the UCB and M3.

7. If 24 volts is not present at the UCB supply air blower motor terminal, check for 24 volts from the room thermostat. If 24 volts is not present from the room thermostat, check for the following:

   a. Proper operation of the room thermostat (contact between R and G with the fan switch in the “ON” position and in the “AUTO” position during operation calls).

   b. Proper wiring between the room thermostat and the UCB.

   c. Loose wiring from the room thermostat to the UCB.

8. If 24 volts is present at the room thermostat but not at the UCB, check for proper wiring between the thermostat and the UCB, i.e. that the thermostat G terminal is connected to the G terminal of the UCB, and for loose wiring.

9. If the thermostat and UCB are properly wired, replace the UCB.

10. If the blower motor runs with the fan switch in the “ON” position but does not run shortly after the furnace has ignited when the fan switch is in the “AUTO” position, check the room thermostat for contact between R and G during “W1” calls.

On calls for heating, the supply air blower operates but the draft motor does not (the room thermostat fan switch is in the “AUTO” position).

1. The draft motor has inherent protection. If the motor shell is hot to the touch, wait for the internal overload to reset.

2. If the motor shell is cold with the room thermostat calling for heat, check for line voltage at the motor's Mate-N-Lok connector attached to the evaporator partition. If line voltage is present, replace the draft motor.

3. If line voltage is not present, check for line voltage at the heat relay (RW1) contacts in the main control box and check to see if the (RW1) is pulled in.

4. If the (RW1) relay is pulled in, check for a loose line voltage connection.

5. If the (RW1) relay is not pulled in, check for 24 volts at the (RW1) coil. If 24 volts is present, replace the (RW1) relay. If 24 volts is not present, check for a loose 24 volt connection back to the relay board and check the connections from the room thermostat to the relay board. If all connections are correct, replace the relay board.

The draft motor runs but the furnace does not light and the sparker does not spark.

1. The ignition control (IC1, IC2) may be locked out due to either a flame roll out or 100% shut off. These safety features are described above. If lock-out has occurred, 24V must be removed from the ignition controls. This is done at the unit or by resetting the room thermostat. After resetting 24V, check for proper furnace operation. If lock-out continues to occur, locate the source of the problem and correct.

2. Check all 24 volt connections from the relay board to and in the gas heat section. Check low voltage connections to the (ETD) located in the control box.

3. If the furnace is hot, it may be out on an over-temperature condition, wait for limit reset.

4. If the furnace is cold, check for 24 volts at wire 241 attached to the electrical time delay (ETD) located in the main control box. If 24 volts is not found, replace the ETD.

5. 24 volts is found at wire 241, remove the wires attached to the (TDR) and with a VOM, check for continuity across contacts 1 and 2. If none is found, the (TDR) is open and must be replaced. If there is continuity, re-attach the wires.With the draft motor running, check for 24 volts at terminal 4 of (RW1-2) and (RW2-1). If 24 volts is not present, the centrifugal switch (CS) has not closed or has gone bad. Check the line voltage to the unit - if it is correct, replace the draft motor. If line voltage is low, call the power company.

6. Check for 24V at terminal 2 of (RW1-2 and RW2-1). If 24V is not present, check for 24V at (RW1 and RW2) relay coils. If these relays are pulled in, then check for a loose connection at terminal 2 and terminal 4 of each relay. If no problem is found, then replace (RW1 and/or RW2) as required.

7. If 24 volts is present at the ignitor controls, check all control wiring at the ignitor controls and the high tension wire to the ignitors. Check that the ground wires from the ignitor controls, the gas valves and pilot burners are all intact and making good electrical connection. Check to make sure that the ceramic insulator on the pilot ignitors or sensors is not broken or cracked, if all are intact, replace the ignition control IC1 or IC2.

The draft motor runs and the ignitor sparks at the pilot burner but the pilot does not ignite and a gas odor is not detected at the draft motor outlet.

1. Check to make sure gas is being supplied to the unit. Make sure that the gas pressure to the unit is within the proper limits as described in the “POST START CHECK LIST” page 64 and that the pilot adjust screw is allowing some flow of gas as described in “PILOT CHECKOUT” page 65.

2. Check all wiring between the ignitor control and the gas valve. Check to make sure the ground connections are intact.

3. If the wiring is intact, check for 24 volts across terminals “PV” and “COMMON” on the ignitor control. If 24 volts is not present, replace the ignitor control.

4. If 24 volts is present, remove the pilot burner and remove the pilot orifice from the pilot burner. The orifice is removed in the direction opposite the flow of gas. Inspect the orifice for obstruction. If it is clear, replace the main gas valve.

The ignitor sparks at the pilot burner but the pilot does not ignite and a gas odor is detected at the draft motor outlet.

1. Adjust the pilot adjust screw on the gas valve as described in “PILOT CHECKOUT” page 65.

2. Check the supply pressure as described in “POST START CHECK LIST” page 64. Make adjustments as necessary.

3. Check the pilot orifice and carryover tube for obstruction as described in paragraph above. Clean as needed but the problem should not be the gas valve.

The pilot burner ignites but the ignitor continues to spark and the main burners do not ignite.

1. Make the same checks and adjustment as described in “PILOT CHECKOUT” page 65.

2. Check the supply pressure as described in “POST START CHECK LIST” page 64. Make adjustments as necessary.

3. Make sure that the pilot burner is not bent or damaged.

4. Make sure that the ground connections at the pilot burner, gas valve and ignitor control are intact. Check the high tension wire for good electrical connection. If all are intact, replace the ignitor module.

The pilot burner lights and the spark stops but the main burners do not light.

1. Check electrical connections between the ignitor control and the gas valve. If intact, check for 24 volts across terminals “MV” and “COMMON” terminals. If no voltage detected, replace ignitor control. If voltage is present, replace gas valve.

Furnace lights with roll-out or one burner has delayed ignition.

1. Make sure that the carryover is aligned properly with the flame sensor as described in “PILOT CHECKOUT” page 65.

Main burners light but exhibit erratic flame characteristics.

1. Adjust air shutters as described in “BURNER AIR SHUTTER ADJUSTMENT” page 65.

2. Check the main burner orifices for obstruction and alignment. Removal procedure is described in BURNER INSTRUCTIONS page 65. Clean or replace burner orifices and burners as needed.

UNIT FLASH CODES

Various flash codes are utilized by the unit control board (UCB) to aid in troubleshooting. Flash codes are distinguished by the short on and off cycle used (approximately 200ms on and 200ms off). To show normal operation, the control board flashes a 1 second on, 1 second off "heartbeat" during normal operation. This is to verify that the UCB is functioning correctly. Do not confuse this with an error flash code. To prevent confusion, a 1-flash, flash code is not used.

Current alarms or active restrictions are flashed on the UCB LED. Pressing and releasing the ALARMS button on the UCB can check the alarm history. The UCB will cycle through the last five (5) alarms, most recent to oldest, separating each alarm flash code by approximately 2 seconds.

In some cases, it may be necessary to "zero" the ASCD for the compressors in order to perform troubleshooting. To reset all ASCDs for one cycle, press and release the UCB TEST button once.

TABLE 33: UNIT CONTROL BOARD FLASH CODES

Flash Code	Description
On Steady	Control Failure - Replace Control
Heart Beat	Normal Operation
1 Flash	Not Applicable
2 Flashes	Control waiting ASCD[1]
3 Flashes	HPS1 - Compressor Lock out
4 Flashes	HPS2 - Compressor Lock out
5 Flashes	LPS1 - Compressor Lock out
6 Flashes	LPS2 - Compressor Lock out
7 Flashes	FS1 - Compressor Lock out
8 Flashes	FS2 - Compressor Lock out
9 Flashes	Ignition Control Locked Out/ Ignition Control Failure / Limit Switch Trip / No Jumper Plug in Heat Section
10 Flashes	Compressors Locked Out On Low Outdoor Air Temperature[1]
11 Flashes	Compressors Locked Out Because The Economizer Is Using Free Cooling[1]
12 Flashes	Fan Overload Switch Trip
13 Flashes	Compressor Held Off Due To Low Voltage[1]
14 Flashes	EEPROM Storage Failure (Control Failure)
OFF	No Power or Control Failure

1. These flash codes do not represent alarms.

The control will flash 250ms on and 250ms off for status codes. The control will separate the flash codes with a 2 second off delay between flash codes. Under normal operation, the control will flash the LED at a rate of, 1 second on and 1 second off. This will be the “Heart Beat”.

TABLE 34: REHEAT CONTROL BOARD FLASH CODES

FLASH CODES	DESCRIPTION
On Steady	This is a Control Failure
1 Flash	Not Applicable
2 Flashes	Hot Gas Reheat is on with Y1 Output (No Call for Cooling)
3 Flashes	Y1, Y2, and Hot Gas Reheat is on because of a call for Y1 and Humidistat. See alt operation
OFF	No Power or Control Failure

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